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STATION'S QUARTERLY REPORT

4th Quarter
Calendar Year 1949



*Northeastern
Forest Experiment Station
Upper Darby, Pa.
V.L. Harper, Director*



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Northeastern Forest Experiment Station

QUARTERLY REPORT

4th Quarter
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GENERAL

by Ted Larson

This is the time of year when the Director and his division chiefs are doing some heavy thinking about the Station's annual report and about plans for the coming year. These plans, including a brief but important "program of work" will emphasize the Station's main objectives--jobs that will be stressed during the coming year. These jobs include Information and Education work and other administrative management projects, as well as research jobs.

The I&E project will have high priority. Regional Forester Swingler and Director Harper have planned a region-wide I&E training program that will get under way in January. The purpose of the training is to acquaint all Forest Service people in the region with the current problems, programs, and policies of the Forest Service; to show them their part in the I&E program; and to show them some of the ways they can do their part of the I&E job.

This I&E work is important because it spreads over practically all our activities, not just once in a while, but day by day. We in the Forest Service think we are doing an important job, and we try to do it well; naturally we want the people we work for to know and understand what we are doing, and why.

The first part of the I&E program is a series of conferences. Personnel located near Philadelphia will attend conferences to be held at the regional office on Jan. 4 and 5. Later in the month a team headed by Mr. Swingler and Dr. Harper will visit each National Forest in the region to conduct a 2-day I&E conference at each forest. Experiment Station people at research centers will attend conferences at the National Forests most convenient for them to reach.

Other aspects of the I&E job are also being worked on. Among these is a series of short articles about writing, which Ted Larson is preparing. These will be published by the Region 7 Office of Personnel in its Personnel Training Series.

Changes in research center names

Two changes in research center names recommended by the Station have been approved by the Washington Office.

"Coastal Oak Pine Research Center" is the new name to designate the consolidation of the former Chesapeake center with the other forest management research units in the coastal oak pine areas of New Jersey, Maryland, Delaware and Pennsylvania. The headquarters of the new Coastal Oak Pine Research Center are in Upper Darby. This center now includes the active field units of Beltsville Experimental Forest, Lebanon Experimental Forest, and the genetics work at Morris Arboretum.

"Northern Hardwoods Research Center" is the new name for the former Winnepesaukee Research Center. The headquarters of the Northern Hardwoods Research Center are at Laconia, N. H., as before.

If you have any questions about the organization of the Station or the names of the various units, please refer to the Forest Service Organizational Directory (January 1950) published by the Department. The Station organization is outlined on pages 67-68 of this pink directory. It shows the names and locations of the research centers, man in charge, mailing address, and experimental forests.

Personnel

George Cashion, head of the administrative services section will leave the Station on February 6 to join the Fiscal Agent's staff in Region 7. George will be replaced by Robert Bain, formerly of the Fiscal Agent's staff in Region 7.

In announcing this double transfer, Dr. Harper said, "We will all miss George. He has helped us organize our administrative and fiscal policies in the Station during the last four years, and during that time he has gained a fine reputation...We are glad he has this opportunity in fiscal activities...We feel fortunate in having Bob Bain as our new leader in administrative and fiscal matters. Bob has had much experience both on National Forests and in the Fiscal Agent's office and looks forward to his new work with us in research administration."

Theodore C. Flint will also transfer to the Regional Office early in February. Ted, who has been a member of the Division of Flood Control Surveys at the Station, will join the regional State and Private Forestry division.

Spence Potter has been detailed to the Washington Office on a foreign forestry assignment that may last several months.

Tom Clark (Mountain State) and Ned Bethlahmy (Delaware Basin) are preparing to go to Washington to attend the statistics seminar. Sid Weitzman (Mountain State) and Wayne Banks (Upper Darby) recently completed the course. Banks has been assigned to drain studies in the Forest Survey.

Reports from M. J. Williamson, who is on educational leave at Yale University, indicate that he is making good progress in his studies. Mac expects to complete work for his Master's degree in June. His thesis deals with "cartridge" planting of newly germinated white pine seedlings.

Christmas party

Of course the highlight of the holiday season was the Christmas party for children of the Station personnel, held at the Upper Darby office on December 22. About 40 children attended. Lem Miller again played the role of Santa Claus; besides the gifts there were movies, singing, and refreshments to keep the small fry busy. The Christmas tree was a 16-foot Norway spruce donated by Forest Preston II, of Forest Farm, RD 2 Oxford, Pa. Ken Clark and Harry Camp were chairmen of the committee that arranged the party.

A Christmas luncheon was held in the Upper Darby office on December 21. It was planned and served by the office girls. It is hard to pin the credit on any one of them, because they all seemed to have a hand in it.

A newsy letter from Ineson

A letter from Frank Ineson, who left the Station to accept a position on General MacArthur's staff in Japan, has been read with great interest by most of us at the Upper Darby office. Frank described a recent trip to Fukushima Prefecture to study the problems of forest taxation and the possible impact of a proposed new tax system on the forests and forest industries. Most of his letter is reproduced here:

"Earlier this year General MacArthur arranged for a group to study and make recommendations relative to the Japanese tax system or lack of system. The group was known as the Shoup Mission. In September it came out with a four-volume report recommending some rather drastic changes in the tax system, involving simplification and a separation of the revenue sources of the national, prefectural, and municipal governments.

"My study is supposed to evaluate the probable effect of the proposed legislation on the forests and forest industries and to make specific proposals where needed. Forest owners have been especially burdened under a large number of taxes, many of which appear to be duplicating. Every effort is apparently made by the forest owners to evade taxes whenever possible. Investigation of initial returns usually leads to doubling the total amount of tax paid but still the indications are that the tax officials are collecting only a portion of the revenue called for by law. Furthermore, prefectural tax officials are reluctant to give up the hold they have had on the municipalities through subsidies. The municipalities on the other hand, are looking forward to increasing local autonomy.

"The forests of Japan have been very seriously overcut, first to serve the war effort, and, since the war, for rehabilitation. Floods and erosion have been on the increase so that large funds have to be appropriated for disaster work. The inflation which was halted this year has left few small owners with the funds needed for replating cutover areas even though they are subsidized to the extent of 50 percent of planting costs. Just as in the states forest owners are putting up a big hue and cry as to the burden of taxes and I am inclined to agree with them here. The Shoup Mission recommendations will give some relief to this group.

"The agricultural land reform which prohibits anyone from owning more than two and one-half cho (a cho is about two and one-half acres) of cropland is playing an important role in the democratization of Japan. Many large forest owners, however, formerly obtained a substantial part of their income from rentals of cropland. They are now cutting off their timber to provide the income they formerly received from rentals. Smaller landowners are also cutting heavily because of their need for money. The need for new homes is still large and of course, Japan can no longer import a substantial portion of its timber requirements from its colonies.

"Many of you will be especially interested in the life of the Japanese as I encountered it in Fukushima Prefecture. My interpreter Tom Sasaki a Nisei, and I took the train from the Tokyo Ueno railroad station Monday morning. We were accompanied on the trip by two representatives of the Forestry Agency of the Ministry of Agriculture and Forestry, a representative of the national federation of forest owner associations, and, while in Fukushima Prefecture, by several members of the state forester's office. The train to Fukushima which is about 160 miles north of Tokyo had an Allied Forces car attached in which we rode. Allied personnel are now permitted to ride in Japanese cars and if we make a personal trip we have to pay the same as anyone else. Official trips are covered by transportation requests. We get no per diem for lodging is paid for for authorized hotels and we have to carry along K rations for meals that cannot be taken in Army messes. Those living in homes with their dependents can purchase food at commissaries for such trips. We are still prohibited from eating Japanese food except certain seafood items that can now be purchased. Eating K rations, however, meal after meal is a real chore and the Japanese are cooking more and more western-style food for American consumption. One sees fried chicken, steak, chops, broiled fish, baked fish, rice and chicken, American-like salads, creamed soups, cookies, and many other American concoctions.

"Although the Japanese meal at home is simpler, I have only observed the things they eat at a party or at noon meals while on tour between stops. For these meals everyone squats cross-legged on a cushion or sits on their heels. A small table, raised about a foot above the straw-mat floor covering, is placed in front of each individual. Everyone is of course either barefoot or in their stocking feet - shoes are always left at the entrance to a hotel and light slippers donned for use in walking through the corridors. At parties the guests are served by geishas as well as hotel girls but the latter only usually handle this function at noon meals.

"After everyone has squatted on his cushion the geisha girls offer to fill the sake cups with hot sake (sake is usually served hot). All drink the first cup of sake together but thereafter each one drinks by himself or when approached by another for a joint-drinking. This consists of one offering his sake cup to another who holds it while the first individual fills the cup. After drinking the contents, the cup is passed back to the first person who holds it while his drink is poured. While carrying out this custom they appear careful not to stare at the other individual as if to see whether or not he actually drinks the sake. If one decides he has had enough, he will pass the filled cup to a geisha to drink for him. Sake is a light rice wine of about 12 percent alcohol content. The cups used are small, less than an inch high, and considerable sake is consumed without much immediate effect. As the evening passes on the Japanese become more jovial under the influence of sake.

"A meal often starts with a bowl of hot soup that becomes a custard if left to cool. It has a few greens in it and may have ginko nuts or small pieces of meat. On the table at the same time are usually a piece of raw fish, a bowl or two of boiled greens, and possibly a few pieces of pickled radish. After a lapse to allow the first course or so to settle, baked or broiled fish may be brought in, followed by breaded meat, prepared in pieces about the size of a small chicken leg. Along with these items there may be cold slaw and other raw vegetables. Next comes another bowl of soup, this time usually a watery soup with small mushrooms floating around. And last but not least comes a large bowl of rice. Immediately following the rice comes several cups of hot green tea. Sake is consumed during the entire meal.

"The Japanese use chopsticks to consume all this food. How they put away all the food that they do is really amazing to me. They probably look forward to these parties as an opportunity to get filled up with food they don't generally get at home.

"Between courses and after the meal the geishas sing and dance. One or two play samisens, a three stringed instrument somewhat like a guitar, while the others dance. Usually they all sing together and sometimes they pass out little books of songs so that the guests can sing too. Guests may also participate in some of the dances. One that especially fascinated me was about coal mining. One made the motions of filling his shovel with coal, throwing it over his shoulder into a coal car, pushing the car, brushing the coal dust off his hands, and then repeating over and over again.

"Japanese music is rather quaint and many of the dances are slow-motioned. The geisha girls are usually good looking and except in some districts of the larger cities usually confine their activities to entertainment. This includes small talk that is supposed to keep the busy man's thoughts off his business. All of these girls wear kimonos with obis or broad belts, folded in the back. They are as picturesque as they have been pictured in travelogues.

"Occupation personnel are now permitted to stay at Japanese hotels. This policy is new since my arrival. The hotels I have stayed at are perfectly beautiful but by American standards are built for summer weather. The sides are glass or thin wooden doors with the interior rooms similarly shut off from the corridors. Each room has an alcove, usually with a lovely piece of statuary or carving, and with tastily arranged flowers. No beds are in sight for these consist of heavy quilts that are spread out on the straw mat at night. I either had a private room or shared one with my interpreter but I saw some Japanese rooms in the morning with maybe 15 people stretched out in them. It surely is an efficient arrangement for using small space day and night. When one retires, one crawls in under a layer or two of heavy quilts, depending on the weather. Most Americans have to have an extra quilt spread over their feet because the Japanese are so short and the quilts designed accordingly. The quilts reminded me of German feather beds but the under layer is much harder.

"Fukushima Prefecture is noted for the number of its hot springs. I had two or three hot springs' baths each day on the trip and got so I could get into water that I formerly would shrink from. In the cities joint bathing of males and females is forbidden but in the country it is quite the custom. I saw several examples but my interpreter and I were either given a pool to ourselves or left alone when we entered a public one. Some Japanese are apparently embarrassed by the presence of Americans in their pool but I understand from some of the men that this is not always true. The practice is to soap oneself while sitting on a small stool about four inches high on the edge of the pool. One then dips water from the pool and pours it over oneself to wash off the soap before entering the pool. The pools range from those large enough for three or four persons to those in which one may swim. The hot springs water is usually flowing in a steady stream into the pool and is often sulphur-like in taste or contains other minerals. I found the baths very refreshing and imparting sufficient warmth to the body to allow one to sit through the long party in silk and cotton kimonos without discomfort from the cold.

"More later, I hope.

Frank.

"

QUARTERLY REPORT -- EDITOR

October-December 1949

by Ted Larson

STATUS OF PUBLICATIONS

Published during quarter

✓ Banks, Wayne G., and Rettie, James C.

✓ 1949. RESTOCKING CONDITIONS ON THE BURNED-OVER FOREST LANDS OF SOUTH-
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✓ Camp, H. W., Jr., and Bickford, C. A.

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✓ 1949. LUMBER VALUES FROM GRADED LOGS—BLACK CHERRY AND OAK—AT A
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✓ 1949. FUTURE PROSPECTS FOR FUELWOOD CONSUMPTION.
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✓ Harper, V. L., and Rettie, J. C.

✓ 1949. THE WOOD-SUPPLY SITUATION IN NEW YORK STATE WITH SPECIAL
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1949. WHAT'S NEW IN SAWMILLING. (Part 2)
Canada Lumberman 69 (10): 47-48, 72, illus.

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1949. SOME ANOMALOUS FIR FLOWERS.
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1949. HOLLY HYBRIDIZING TECHNIQUES.
Holly Soc. Amer. Proc. 4: 9-16. Millville, N. J.

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Schreiner, Ernst J.

- CLONAL SELECTION FOR BETTER CITY SHADE TREES.
To Natl. Shade Tree Conf. Proc. 25.

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- GENETICS IN RELATION TO FORESTRY.
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QUARTERLY REPORT -- BIOMETRY

October-December 1949

by C. A. Bickford

GENERAL

Two recent library accessions are noteworthy for those interested in problems of design and analysis:

STATISTICAL METHODS IN RESEARCH, by Palmer O. Johnson

SAMPLING METHODS FOR CENSUSES AND SURVEYS, by Frank Yates

The first looks like an excellent new book with a fresh treatment by one who studied under Fisher at Rothamsted but writes more understandably. The second is written for the nonmathematician with experience in handling figures and a knowledge of presenting statistical data. Separate chapters deal with sampling design, compilation of this data, estimation of the sampling error, and efficiency. This book should help anyone with a problem in sampling and should be especially useful to Forest Survey and Flood Control Surveys. Formulae are kept to a minimum.

Three articles have appeared in recent issues of Science (110: 461, 491, and 517) by Cantril, Ames, Hastorf, and Ittelson. The first was THE NATURE OF SCIENTIFIC INQUIRY in the issue of November 4, 1949. These deal directly with psychological research, but much of the philosophy and discussion is equally applicable to forest research and should be helpful background material for those of us who are researchers rather than surveyors. On a lighter vein: GOVERNMENT SUPPORT OF RESEARCH Science 110: 701-707 is also suggested.

Survey design

The analysis of design, reported on last quarter, failed to indicate enough advantage of 3-step over 2-step design to change. It did bring out the advantage of optimum allocation, however, and survey procedure has been modified accordingly: Optimum numbers of field and photo plots are calculated by counties from the design formulae; the indicated number of photo plots are put on by machine, using integral numbers of plots per print; the photos are then sent to the field crews for photo interpretation; they in turn report numbers of photo plots by "PI" class and from these data, sampling intervals by "PI" class are calculated to give the desired number of field plots, usually exact and always within 1 or 2 plots. The revised procedure, by increasing control over number and distribution of field plots, is expected to result in smaller sampling errors of volume.

Design of flood control survey

In the past 6 weeks, considerable study has been devoted to an attempt to write a design formula for flood control surveys. If it could be written, it would provide an objective basis for determining numbers of samples required for the various parts and would also permit calculation of sampling error. The formula has not been written out in full, but the approach appears to be through use of an index which is affected by soil, cover, infiltration, runoff, discharge, precipitation, and proposed changes in cover and land use. Reduction in peak discharge resulting from a particular storm has been suggested; this storm might be "average bad", average of storms that flood, the 20- or 50-year storm, or a particular storm of record.

Full specification depends on more perfect knowledge, especially hydrological. In the meantime, better design can be used in land use inventories. To determine numbers of samples here, a formula for estimating reduction in infiltrated water from the chosen storm is suggested. This requires area by class, and rate of water entrance, as well as precipitation data. Where aerial photographs are available, an approach similar to that used by Forest Survey can be used to obtain areas by class. Determination of average entrance rate is from a sample too, but is limited by cumbersome equipment.

Monongahela inventory

When the Director was in West Virginia in September, Supervisor Anderson raised the question of using aerial photographs to obtain an inventory of the Monongahela National Forest. Bill Curnutt came to Upper Darby in October to obtain further information on design and photogrammetry. This problem differs from that of forest survey and flood control in that location of timber is as important as amount. Our suggestion therefor was to delineate desired classes on the photos and sample within them. An incidental problem led to a test of mean volume per acre on and off the National Forest in Pendleton, Pocahontas, and Randolph Counties, West Virginia. Volume was sorted in 4 species groups and 3 diameter groups as well as 5 stand classes. The "t" test failed to reveal any significant difference in mean volume in 40 comparisons. There was no reason to expect a significant difference but it is possible that extension of the principle could lead to further reduction in number of ground plots for forest survey.

How to check and construct volume tables

This was published in May 1948 as something for immediate use in the expectation that after a few months there would be a flood of comments and objections that would guide revision into a more lasting form. The flood turned out to be an intermittent trickle. There are two points to make however: (1) The suggested comparison of an available table contains an improper application of the "chi-square" test; and (2) formulae for volume on page 7 should be squares of diameter rather than diameter alone. The correct test to use is "t" for checking an available table.

Independence in sampling

A sample is a part taken to represent the whole. Erroneous estimates of the whole, based on a sample, are usually due to the failure of the sample to be truly representative. A peculiar attribute of sampling is the difficulty of directly choosing a representative sample; such choice is nearly always biased, often subconsciously. If we go into a stand of trees, pick out an average tree, measure it and compare it with its neighbors we will usually find our "average" tree is taller, has a larger diameter, and is growing faster than the tree average obtained from measurements of all trees.

This is a universal phenomenon that is not at all peculiar to foresters. It has long been recognized that sampling based on a conscious effort to be representative usually gave results that did not agree with experience. Sampling based on arbitrary objective definitions, on the other hand, usually provides a good estimate of the whole. This latter kind of sampling is commonly called "random-sampling." There is no really adequate definition of random in the sense that it is used in samplings. The more you attempt to specify it, the more confused you become.

"...it appears hopeless to define random order in a useful way..." W. A. Shewhart (Statistical Method from Viewpoint of Quality Control." 1939.)

But without definition, there is usually little question of what is meant or how to draw a random sample.

Two plots in a uniform pattern on every print of an aerial photograph project is not a random sample since as soon as one plot is specifically located, all others are also located. Such a design is ordinarily more practical than a purely random one, however, as the latter is so much more laborious. The former, even though not strictly random, provides a good estimate of the mean, or total, and it is only when independence is affected that bias is introduced into estimation of the sampling error.

Good sampling requires that each observation be independent of all others. Dependence in a matter of location is trivial--independence in the measured attribute is the requirement. The condition of independence is satisfied when correlation is zero and is often so stated. In classified data, adjacent plots are more likely to be of the same class, than plots in general, if the interval between them is small. When this situation exists, these adjacent plots are not independent. This is also a problem in clustered sampling.

Methods are available for adjusting to minimize this effect. The danger lies in using formulae developed for random and independent samples in situations where these conditions do not hold. Many failures blamed on sampling have been the result of improper use.

QUARTERLY REPORT--FOREST MANAGEMENT

October-December 1949

by K. M. Clark

During this quarter the division concentrated much effort on the Logging School, held November 7 - 18 on the Fernow Experimental Forest. A good deal of Sims' time prior to the school was put upon planning of the arrangements, both at Upper Darby and in the field. Attendance was from all branches engaged in--or expecting to engage in--logging operations on experimental forests. The division was represented at the school by Sims and Clark. Much of the instruction was furnished by Fred Simmons of F.U.S.; special subjects or demonstrations were handled by Seth Jackson of the Chief's office, Lynn Correll of R-7, Charles Lockard of F.U.S., George Doverspike of forest economics, and by representatives of the Paulson-Webber Cordage Co. Fine cooperation was extended by the Monongahela National Forest. Local details were handled by the Mountain State Branch.

In addition to the Logging School, Sims spent considerable time in the field on inspections of the Hopkins Forest, the White Pine and Penobscot research centers and on a short visit to the Lebanon and Eastern Shore Forests with the Director. In connection with this latter trip, the possibility of developing some work of demonstration value in cooperation with the State of Maryland was considered.

Working plans submitted by the Anthracite, Mountain State, and Adirondack centers were reviewed, as was the problem analysis submitted by the Penobscot center. Cooperative agreements proposed by the Anthracite center and by the Beltsville Experimental Forest were reviewed and put into suggested or final form. Two manuscripts submitted from the Lebanon Forest and one from the Beltsville Forest were also reviewed.

As a matter of assistance to Forest Survey and F.U.S., Clark spent several days in the review and coding of the returns of the Forest Industry Questionnaire.

Most of Westveld's time was spent in writing. The spruce-fir management manuscript occupied his main attention, but some time was given to several short papers. He is now revising Occasional Paper 12, "Yields for Cut-Over Spruce-Fir Stands in the Northeast". Recently he was guest speaker at the annual meeting of the Maritime Section of the Canadian Society of Forest Engineers, held at Amherst, Nova Scotia.

Hough has been engaged largely in the analyzing data obtained from 1949 field studies of black cherry regeneration. Preliminary reports have been submitted covering:

1. Nine study areas, varying from 3 to 26 years of age, on the Allegheny National Forest. These data indicate that heavy cutting in second-growth stands, with or without fire, does not encourage adequate regeneration of black cherry or white ash in the third growth.

2. Examination of the third-growth regeneration on the Wolf Run diameter limit cutting plots established in 1939, shows good regeneration of black cherry on the 5 inch and 8 inch diameter limit cuttings, contrasted with failure of black cherry to enter the 11 inch diameter cuttings. On good black cherry sites, heavy cuttings on areas of 1/2 to 3/4 acres, well dispersed over larger areas of partial cuttings, seems to secure the best establishment of third-growth black cherry.

3. An analysis of black cherry regeneration and of other species on a strip cutting (power line right of way). Except in a few steeply sloping areas, regeneration on the strip, cleared 14 years ago, has been very slow. Initial germination and early survival was satisfactory, but growth into larger sizes is unsatisfactory.

Hough represented the Station at a two day "show-me" trip, sponsored jointly with the Allegheny National Forest, the Pennsylvania Department of Forests and Waters, and the Armstrong Forest Company, in October. He and Mr. Mattoon of Region 7 visited the Allegheny National Forest on December 20 to assist in selecting a site for cooperative game food plantings and plantation release by the Warren Field and Stream Club.

In October, Schreiner and Wright selected additional hybrid poplars at Frye, Maine, for propagation and clonal tests. Cuttings were obtained from 44 new selections. The poplar test plantings at the Massabesic, Hopkins, and Beltsville Experimental Forests were inspected. Little rust was found at Frye, Maine, and on the Massabesic, but at Hopkins and Beltsville some clones developed heavy late rust. A uniform system of rust rating was developed. All first year height measurements on the 1949 clonal tests have been computed and analyzed.

In November, in connection with the inspection of genetic plantings at the Standing Stone Forest, Schreiner gave a lecture on forest genetics to the Forestry Club at Pennsylvania State College.

At the Arboretum during October and late December, seed from the 1949 controlled pollinations, was collected and extracted. During his annual leave, Wright was able to visit the Institute of Forest Genetics at Placerville, California, and also several other experimental stations and universities where genetics work is in progress.

QUARTERLY REPORT--FOREST ECONOMICS

October-December 1949

by Harry W. Camp and J. C. Rettie

FOREST SURVEY

The stepped-up schedule of summer field work, made possible by temporary employment of a number of students, proved to be satisfactory. When these men returned to school the regular field crews took up type mapping and photo interpretation that had been deferred in order to take advantage of the student assistants' help. Work on compilations and reports continued to make progress satisfactorily.

Aerial photography

Difficulty was encountered during the first part of the quarter in obtaining aerial photographs for Maryland in sufficient quantity to keep field work going efficiently. Good photographic weather finally arrived and photography was completed for the State. Photography was also completed for New York State. Some progress was made in obtaining new photography for Pennsylvania, where two contractors completed the flying for 11 counties in the western and central portion of the State.

Inventory

Field work was carried on in New York, Pennsylvania, Maryland. Difficult terrain was encountered in northern New York, but the field men were able to cover an additional 5 percent of the forest area of the State. Approximately 50 percent of the forest area of New York has been inventoried to date. Six more counties in southeastern Pennsylvania were covered, making a total of 15 percent of the forest area that has now been inventoried. State and Forest Service crews have covered approximately 33 percent of the forest area of Maryland.

Growth and drain

Little additional work was done on drain during this quarter. The major activity, in which nearly all field stations participated, was making follow-up contacts to obtain data on the amount of wood used in manufacture.

Analysis of growth data from 840 sample trees in Vermont was started.

Compilations

The backlog of field data to be punched on tabulating cards was worked out this quarter and card punching is now back on a current basis.

Tabulations for all reporting units in West Virginia were completed and three survey releases were compiled: Potomac Section, Foothills Section, and Little Kanawha-Elk Hills Section.

Volume tables have been checked, and new volume tables were prepared for use in New York State.

Tabulations for the wildlife habitat survey were completed for the Conservation Commission of West Virginia. This concludes the co-operative agreement between the Station and the Conservation Commission.

Reports

Forest Survey release No. 8, "Forest Statistics for the Cumberland Mountains Section, West Virginia" has been distributed. Three additional releases for West Virginia are being reviewed prior to processing.

Inspections and visitors

Two conferences with Washington Office officials were held at Upper Darby during the quarter. Dr. Crafts and Dr. Josephson met with us to discuss questions pertaining to the National Forest Survey Manual. Mr. Osborne came to Upper Darby to discuss the possibilities of initiating a system of continuous forest inventory on the Eastern Shore of Maryland on a trial basis. It has been decided that this shall be a co-operative project of the Station and Washington Office.

FOREST ECONOMICS INVESTIGATIONS

Restocking conditions on fire-damaged lands in southwestern Maine

Station Paper No. 30, entitled as above, was issued in October. This, at least for the present, completes the work on this project.

Marketing and prices of farm woodland products

In the marketing survey carried on in cooperation with the Extension Forester of Rhode Island, the field work was completed. Work on the writing of the two bulletins that will summarize results is now in progress.

The test-demonstrations of log grading have gone forward satisfactorily. The first, held at a sawmill in western Pennsylvania, showed that the log-grade specifications for standard factory lumber are applicable to black cherry even though this species was not included in the test runs conducted by the Forest Products Laboratory in the development of the grade specifications. The log grades in general worked very well at this mill—so well that the operator is considering putting them into use. A second test-demonstration has been partially done at another sawmill in West Virginia. Others are scheduled for the immediate future. Results of the first test have been made available for local use in a short release. Others like it will follow as the work is done. At the end of these studies, the final results will be consolidated in a Station Paper.

Owners of small woodland holdings in 23 new england towns

The report on this study was submitted for review to Region 7 and the Washington Office. Both offered a number of helpful criticisms that were taken into account in the final revision. The report is now about ready for processing.

Evaluation of the experience of the Otsego Forest Cooperative

Comments from the Board of Review proved to be very helpful. Final revision of the manuscript by the author has been completed. The manuscript is now in the hands of the Station editor.

Hardwood utilization problem in Maine

The University of Maine invited the leader of the Penobscot Branch and the chief of this division to present papers at its November 3 conference on Maine's natural resources. The subject chosen dealt with timber management and with hardwood utilization. The latter paper was subsequently published as a feature article in the lumber survey number of the (Boston) Commercial Bulletin.

QUARTERLY REPORT-FLOOD CONTROL SURVEYS

October-December 1949

by G. L. Varney

The water shortage

The crisis in the New York water supply shortage made National headlines. Despite the fact that all of the New York water supply reservoirs spilt water last spring, a continuing deficiency in rainfall since the beginning of June, coupled with a rapidly rising consumption, brought the City to the border of a water famine, has been only partially relieved by fall rains. Rainfall deficiencies over this period were not extreme and have been greater in past years. Storage was used until it was reduced to about 32 percent of capacity before water levels in the reservoirs rose slightly at the close of the quarter.

Some of the reservoirs were empty for the first time since they were filled; this presented an opportunity for studying sedimentation in these reservoirs. Bevan made a short field trip with Lee Prater, photographer from the Washington Office, to look into this situation. The water engineers in charge of the New York water supply stated that sediment had not been a problem, and this was borne out by examination of the empty reservoirs. There was surprisingly little sediment in any of the reservoirs visited.

However, a subsequent study made by Storey showed that there is a sediment problem in the Schoharie Reservoir, the most northerly watershed in the Catskills. At least 8 feet of sediment have been deposited in the section of the reservoir near the intake of the diversion aqueduct. The Schoharie watershed has a high percentage of open land and overgrazing of steep slopes results in much erosion and excessively rapid runoff. This situation will be studied further; it presents an opportunity to get quantitative figures on sediment and runoff in relation to the land use and management pattern in the watershed.

The New York water supply problem has been brought about by a combination of very heavy use, subnormal precipitation, and inadequate storage capacity to tide over such periods. Water-supply engineers stated that the city has been on the verge of a shortage such as this ever since 1881. The situation will be temporarily corrected about 1956 when the full capacity of the Delaware diversion will be available. This additional supply, however, is estimated to supply a safe margin only until 1960.

Personnel

James Ferris, detailed from S.C.S. to assist in the survey of the Upper Susquehanna, completed his assignment on November 1 and returned to S.C.S.

Surveys and preliminary examination reports

Field work in connection with land-use inventory and damage appraisal was completed on the Upper Susquehanna River watershed during November. Analysis of inventory data was started immediately and the inventory of present land use developed as far as it could be pending completion of previous surveys.

Work was continued on the program for the Allegheny watershed. At the end of the quarter this job was 70-75 percent complete. Appraisal of annual damages in this watershed is practically complete. An average annual damage of about 30 million dollars is indicated. Work is continuing on the determination of benefits.

A start was made on the compilation of damage data for the Monongahela watershed. Inventory and program data for this watershed are filed pending completion of the Allegheny survey. A small amount of time was spent on preliminary review of these data during the quarter.

The status of the Connecticut report remains unchanged. It has so far proved impossible to schedule a conference with Vermont. The report will be revised and submitted to Washington as soon as instructions on policy and procedures are received. Agreement was reached with U.S.G.S. on the computations of flood storage on the Farmington River.

The cost figures for fencing were revised for the Merrimack watershed. Additional costs were included for the repair and reconstruction of 9 existing small dams on the tributaries in New Hampshire as the result of a request from the New Hampshire Water Resources Board. The Merrimack report will be revised during the first quarter of 1950.

Cooperation with Soil Conservation Service

Field work is well along on the Delaware River survey. Two men from this office are working on the woodland phase. Present plans are to complete the Delaware report by July 1, 1950. We plan to make the necessary forestry technicians available to S.C.S. to complete the woodland program.

Other activities

A special study of the influences of scale on aerial photograph interpretation was initiated during the quarter. Areas at Beltsville and on the Pocono Experimental Forest were flown at 5 different elevations, resulting in photographs at 5 different scales. Photo interpretation and field check will be made during January. It is hoped that the results will be of great value in future forest survey and flood control work.

Rogers and Bickford are studying the methods and procedures followed on past surveys using aerial photographs, together with the objectives of flood control surveys, in order to prepare a standard flood control survey design with special emphasis on the inventory phases of the survey.

QUARTERLY REPORT

FOREST UTILIZATION SERVICE

October 1 - December 31, 1949

TIMBER CONVERSION

Logging Training Conference

In November, Mr. Simmons and I. H. Sims, Chief of Division of Forest Management at the Station, conducted a two week's logging training conference for branch station personnel on the Fernow Experimental Forest in West Virginia. Fifteen Experimental Forest Superintendents and logging crew foremen from seven Station branches were included among the trainees. The course of instruction stressed safety precautions and cost control on Experimental Forest logging jobs. The schedule included instruction in the choice and care of hand tools; choice, maintenance and operation of power equipment such as tractors and chain saws; felling, skidding, bucking, decking; log and tree grading, layout of operation, and selection and handling of personnel.

Instructors at various sessions on specialized subjects included Seth Jackson, W. O. Safety Officer, representatives from the Paulson-Webber Cordage Co. and the Clarksburg Tractor Co, Don Nieman, Chief Mechanic of the Monongahela National Forest, C. R. Lockard of FUS, and Lynn Correll, Region 7 Personnel Officer.

Beech Utilization Papers

A canvas of the authors assigned to prepare the twenty-three papers proposed by the Northeastern Technical Committee on the Utilization of Beech to comprise the series designed to encourage the more complete and effective use of this "problem" species is being made in connection with the preparation of the Station's annual report. Returns to date indicate that most of the authors are working actively on their assigned subjects and that several of the papers will be ready for review in the near future. Greatest progress reported so far seems to be on the paper on storage of beech logs and bolts being prepared by Scheffer and Zabel, the one on machining by McIntyre of the Vermont Bureau of Industrial Research, and the one on beech for flooring by Lefkof of the Pennsylvania Department of Forests and Waters. The Station is working on the papers for which it has assumed responsibility, and present plans are to complete those on logging and milling of beech, and beech for wood turning and novelties before July 1. A number of the other papers in the series, including several being prepared by Forest Products Laboratory specialists are also scheduled to be completed before this date.

Wyssen Cableway

At the request of the Washington Office, Fred Simmons accompanied a party composed of L. I. Barrett, Chief of the Division of Forest Management Research, I. J. Mason, Chief of the Division of Timber Management, and B. H. Payne in charge of Timber Appraisal of that office on a visit to

the Wyssen Cableway installation in the central part of the Adirondack mountains in New York State in October. The purpose of the trip was to obtain information on the applicability of this Swiss cable logging system to conditions in the Southern Appalachians and the Central Rocky Mountains, where the Forest Service has problems of extracting timber from similarly rough and rocky terrain. The party was joined at Saranac Lake by A. P. Dean, Chief of the Division of Engineering, and John Curry and Bill Rutherford of the Station's Adirondack Branch.

A day was spent at the Wyssen installation with Dr. Alfred Huber, representative of the manufacturer, and L. R. Scheault, Logging Superintendent for the Finch Pruyn Co. on whose lands the cableway is operating. The system was found to be operating very satisfactorily; at about half its rated capacity. About 50 round trips, bringing down about half a cord a trip of spruce pulpwood logs 20 to 28 feet long, were being made each day. A five-man crew was used on the cableway itself, with a single horse and driver taking away the sticks at the bottom landing to be bucked into four foot wood by a two-man chain saw crew and loaded on trucks by a conveyor-type loader. The reason that less than capacity loads were being carried was that assembly of such loads was too difficult and time-consuming on the steep brushy and rocky upper slope where the trees had been felled. Even with an inexperienced crew, however, according to Mr. Scheault, skidding costs were no higher per unit than they had been with tractor and sulky on the more gentle lower slope. The upper slope had formerly been considered inoperable by tractors or even single horses because of its roughness and steepness.

It had been necessary to strengthen the cableway carriage, as fabricated in Switzerland, because of the heavier and faster American motor used, and perhaps because of the inexperienced operator. Both the sides of the carriage and the hook had been reinforced by welding.

It was the decision of the Forest Service group that a heavier cableway would be essential to handle much of the timber in the Southern Appalachians, including the Station's Fernow Experimental Forest in West Virginia; and perhaps in the Rockies also. The present cableway has a safe working load capacity of 3,000 pounds, with a safety factor of 4. Dr. Huber indicated that the company would attempt to design a unit with about double this capacity for American use, but pointed out that there would be difficulties in operating such a unit efficiently because of the proportionally greater loads to be assembled.

The following day was spent on a tour of the Station's Paul Smith Experimental Forest with Branch and College personnel.

Beech in Turning

In connection with beech paper No. 17, "Use of Beech in Turning and Novelties", visits were made to three turning outfits in southern New England. Generally, these turners gave clear perfectly seasoned beech a good rating. The main difficulty appears to be getting perfectly seasoned beech. To explore industrial experience in this field, further arrangements were made with the Wood Turners Bureau, Boston, Mass. to send a questionnaire prepared by FUS and the Bureau to its members early in next quarter.

Log Grades

In October Mr. Lockard participated in the training session for farm foresters from Maine, New Hampshire, Connecticut, Vermont, and New York in Bridgeton, Maine. This group was given introduction to log grading and log defect application and evaluation. Similar material was presented to the logging school held at Parsons, W. Va. in November. Conferences on the place of log grading in experimental forests management were held at Massabesic and Wilkes-Barre Experimental forests. In October, Mr. Doverspike of Division of Forest Economics in cooperation with Pennsylvania farm foresters ran a demonstration test of log grades on cherry and mixed oak at the Endeavor Lumber Co. Mills, Endeavor, Pa. The results of this test were published in a station paper, a copy of which is appended hereto. Preliminary conferences were held with the National Forest Administration and with the Northeastern Lumber Manufacturers Association regarding training sessions in log grading. Both organizations showed an interest in working such sessions into their program in the forthcoming calendar year. Tentative arrangements have been arranged for national forests personnel training session in July and August 1950.

Storage of Hardwood Bolts

An office report by Roy A. Carter, Merle Hillbourne, and Theodore C. Sheffer on results of tests carried on from November 1947 to October 1948 on the chemical treatment of northern hardwood bolts for protection against decay during warm weather storage has been received. The general conclusions were that although the amount of protection given by spraying the bolts with fungicidal chemicals or coating with end coating was not perfect, it is at least one treatment which promises to more than pay for itself. Furthermore, it is apparent that insect attack is not a factor which limits the effectiveness of chemical treatments in control of decay in bolts and logs. The study also indicated that, whereas bark of most species is a good fungus barrier, beech bark has little or no value in this respect. The key to this treatment appears to lie in finding an inexpensive end coating which will protect the ends for 6 to 10 months. Such a coating used in combination with a suitable spray treatment can give complete protection. There are still many problems to be solved once the end coating is found. The chief one of these seems to be to ascertain the safe time lag between cutting and application.

WOOD CHEMISTRY

Small Charcoal Kilns

Late in the last quarter, Mr. Beglinger of the FPL and Mr. Simmons made a field study of the wood distillation industry with particular emphasis on charcoal production. One difficulty in appraising the situation was lack of information on production of charcoal by small kilns which appears to be playing an increasingly large part in the picture. Consequently, arrangements were made with Extension Forester Parmenter of Massachusetts and through Farm Forester Fenton in Connecticut with the extension service agents there to collect information on small kilns in these states. If

this mechanism for collecting information is successful, then it will be extended to other states in the Northeastern territory early in the next quarter. Sessions with Branch Leaders at the Massabesic and Wilkes-Barre Centers indicated anew the desirability of work on charcoal marketing.

Wood Molasses

Last spring experiments at the New Hampshire Agricultural Experiment Station were completed in the use of wood molasses as animal feed. The Experiment Station is very much interested in carrying forward further experimentation. One line is the fundamental study of the utilization of pentose sugars. Heretofore it was difficult to obtain free sugars of this nature as required for experimental purposes. The possibility of getting wood molasses of high and known pentose content offers good opportunity for experimentation along this line. A second desirable line of experimentation is long term tests to determine whether there are unfavorable physiological reactions which short term tests mask or do not bring out. As a result of this interest, FUS aided the Experiment Station's technicians in developing a proposal for an R & M project in this field. No action on this can be expected before F. Y. 1951.

The question of estimated production costs for molasses in small plants is an interesting and timely one. Dr. Aries of the Northeastern Wood Utilization Council studied the production of wood molasses in a plant with the capacity of 20 tons a day. This size being in line with the maximum concentration of waste available in the Northeast as shown by a study of waste made under grant from Federal Reserve Bank of Boston. He studied plant layout, equipment purchases and operating procedures. His conclusion was that a plant of this capacity would cost about \$500,000 and that the production cost of molasses would be about 35¢ a gallon. At the present time, Cuban molasses can be delivered throughout most of New England for about 11¢. The obvious conclusion is that at the present time, wood molasses as a separate enterprise is not a very interesting proposition economically in New England when plants of less than 20 tons a day capacity are considered.

SEASONING

Dry Kiln Clubs

As a result of past field demonstration courses, three dry kiln clubs were formed in this Region. One in Maine (Northeastern), one covering New England and New York (New England) and one covering Pennsylvania (Keystone Club). The New England and Northeastern Clubs met in joint session last June at Conway, N. H. and the Keystone Club held its last meeting November 1948. Since that time these clubs have been dormant and in the case of the Keystone at least have been awaiting outside stimulation. FUS had contacted the officers of New England and Keystone Clubs to help arrange programs for a meeting to be held in the next quarter. Correspondence with the New England Club seems to indicate they have difficulties through inability of the officers to get together and organize. The need

for associations such as these was indicated in a letter from Prof. Harry Rich, University of Massachusetts, in which he states, "It would be just too bad to let this dry kiln association die. I am convinced that here in the Northeast, seasoning presents more utilization problems than anything else. For example, I was just recently called to examine gun-stock blanks, 90 percent rejects during fabrication. I estimate at least \$15,000 loss--about the worst example of honeycomb and collapse I have ever seen."

Mr. Rietz and Mr. Lockard held a two day conference with Messrs. Rishell, McKean, and Poletka of the Teco Laboratories in Washington, discussing the principles of the stress schedules for dry kiln work. In connection with this work there was opportunity to inspect the Teco Laboratories. Teco is interested in modern kiln drying techniques and hopes to set up a service in this field.

A dry kiln operator in New Jersey, a graduate of one of the FPL courses has been in touch with both FUS and the FPL regarding two problems--sticker stain in hard maple and accelerated drying of oak. The Lab gave him recommendations regarding the former which corrected his troubles and advised him on methods of trying to correct the second. His situation is typical of many kiln operators and is worth reciting. He feels that, although he was hired as a full time technician, he is unable to get the full cooperation of management. Management appears to be uninterested in quality control techniques, is impatient in time required for perfect drying, will not provide adequate dry storage (so that results of drying are frequently vitiated) and is now asking the kiln technician to assume other duties which may seriously interfere with proper operation of the kilns. The big problem in this field as indicated by this and similar cases still is how to "reach" management.

Negotiations were entered into with the Plumb Tool Co. of Phila., Pa. which is having a bad performance with its tool handles. Handles are purchased from southern hickory manufacturers and are either given a long period low temperature seasoning treatment or are put in a sand box for shorter periods at higher temperatures. The company, at FUS suggestion, is now making tests to determine whether the different types of treatment yield any different results. In the meantime, sample handles inspected by the FPL showed that most of the fractures occurred wholly or in part at compression failures which were present before the final break. Decay was also a contributory cause. Since the company estimates that at least 50% of handles break in service and since seasoning methods appear not to be causes, further study will be given this matter during the next quarter.

Bending of Solid Wood

The FPL sent Northeastern FUS a manuscript of a proposed publication covering all that is currently known about the bending of solid wood. This manuscript has already been reviewed by Prof. Fred Wangaard of Yale Forestry School and his comments transmitted to the FPL. In addition, FUS arranged with Mr. Frank Parrish, Technical Director of Heywood-Wakefield

Company, Gardner, Mass. and Mr. James Tynan, Technical Director, Spalding Company, Chicoppe, Mass. to review this manuscript.

GENERAL

F.P.R.S.

The Northeast Section of the FPRS held its fall meeting in New York City October 31 - November 1. Mr. Rietz of FPL and Mr. Lockard attended this meeting. The program included papers on integrated utilization, manufacture of kraft linerboard for shipping containers, a clinic on imported woods, a clinic on wood moisture relations, and a group of informal seminars on the seasoning, machining, material handling, gluing, and wood finishes. The attendance ran well over 100 with representatives of industrial firms predominating. The most popular subject was wood moisture relationships. It was interesting to note that in the seminars a majority of the group attended the seasoning session.

Publications

The Washington Office has informed this Station that the 30,000 copies made in the first printing of Simmons' Farmers' Bulletin, "Logging Farm Forest Crops in the Northeast" are about exhausted and that a new printing will have to be made in the near future. Demand for this publication seems to have been heavier than anticipated, not only in the 13 Northeastern States, but also in other parts of the country and in a number of foreign countries.

The Department of Industrial Safety of the government of Guatamala, C. A. has asked for and received permission to translate Simmons' "Northeastern Loggers' Handbook into Spanish for use in that country. An association of Texas insurance underwriters has asked for and received permission to use material and illustrations from Station Paper #24, "Recruiting and Training Labor for Woods Work" in a safety manual being prepared for the Texas Lumbermen's Association.

Simmons contribution to the paper authored by George Drake of the Simpson Logging Co., "Improvements in Logging Techniques in the U. S." written for the U. N. Conference on Conservation and Utilization of Natural Resources was published in the October issue of the Lumberman (Seattle) and the December issue of the Canada Lumberman under the title "Harvesting the Forest Crop in the Northeast and Lake States."

Miscellaneous

Office reports were received from the FPL on the following subjects:

Handling Lumber in Unit Packages in the Northeast by E. C. Peck
Survey of Roofing Felt Mills by H. R. Hrubesky
Hardwood Distillation and Kiln Burning Plants in the Northeast by
E. W. Beglinger.

FUS held conferences with Prof. W. A. Hosmer of the Graduate School of Business Administration, Harvard University, Mr. Harold Sheppard, Economist of the Federal Reserve Bank, Boston, Mass., R. B. Parmenter, Extension Forester, Mass., M. Pochan, Manager, Connwood, Inc., New Haven, Conn., Mr. Carl Whittier, Secretary, Last Block Manufacturers Assoc., Boston, Mass. ...There was also opportunity to inspect the plants of the Heywood-Wakefield Co., Gardner, Mass. and the Spalding Co., Chicopee, Mass...Mr. Lockard spoke on forest products research before the Forestry Club of the University of Massachusetts...Mr. Lockard made general inspections of the Farm Forestry research project in Connecticut and the Wilkes-Barre Experimental Forest...FUS cooperated in visiting about 25 delinquent wood using industries to collect data on lumber use and manufacture for the Forest Service project...FUS gave advice and helped edit a manuscript on power saws for a New York advertising agency...A proposed data sheet on safety in the use of peavies, cant hooks, and pulp hooks by the National Safety Council was reviewed and suggestions for improvement made...Mr. Lockard inspected operations of the Wackerbath Box Co., Granville, Mass. which has unusually mechanized logging...FUS prepared a list of research jobs for the FPL 1950 program...About 50 requests for information on various utilization subjects were answered during the period.

QUARTERLY REPORT--HOPKINS MEMORIAL EXPERIMENTAL FOREST

October-December 1949

by Frank E. Cunningham

Hardhack conversion study (H-1)

Since completing the first year's field work in this study as reported in previous reports, a detailed compass and chain survey has been made of these installations and their positions have been plotted on the appropriate compartment maps. No further work is contemplated on these installations until the field season again opens in the second quarter of the next calendar year when scheduled observations and cultural work will be undertaken.

Consideration is now being given to expanding this study to include the use of silvicides for site-preparation treatments in this type of cover to facilitate plantation establishment. A plan of work for this phase of the study will be prepared during the coming quarter so that it may be put into operation during the next field season.

Genetics

Initial field measurements of the hybrid poplar plantations established on the Hopkins in 1949 in Compartment 4 were completed during this quarter and the data were submitted to Dr. Schreiner for his study.

In preparation for additional plantings and the expanding of this study, three separate areas (totalling 5.6 acres) were plowed this fall. On one area, approximately 0.67 acres in extent, we plan to test several cover crops for their effectiveness in controlling weeds in poplar plantations. Our aim in this study is to find a cover crop that will effectively control weeds that the poplars can tolerate. The two other plowed areas, each approximately equal in size, will be used to duplicate the installations of 1949, but using different poplar clones.

Compass and chain location surveys were also completed on all of the poplar installations and their positions have been plotted.

Small woodland management study (H-2) and cutting practice level plots (H-3)

Considerable effort was made during this quarter to develop markets for the products marked to cut from these areas. Direct sales of either products or stumpage are possible. However, we feel that a cooperative type of study would be feasible for these areas. A contact has been made

which holds some promise success along this line. Arrangements for negotiations are now being made.

Miscellaneous

Because of requests for weather data from our weather station, considerable time has been devoted to tabulating and summarizing the data we have on hand and preparing it for distribution. Since re-opening the Hopkins, we have accumulated data for 1948 and 1949. These have now been tabulated and summarized. These data, particularly temperature and precipitation, have been made available to the Meteorology Department of Williams College, The Massachusetts Department of Public Health, and Dr. Willis I. Milham, Professor Emeritus of Meteorology and Astronomy of Williams College, who is engaged in revising and bringing up to date his bulletin, "The History of Meteorology In Williams College", published in 1936.

During the last quarter, a start has been made in developing a system of individual compartment maps for the forest. To that end, compass and chain surveys are being made of each compartment, boundary markers placed and located, and features such as roads, trails, streams, and research installations are being located.

The staff of the Hopkins Forest spent an interesting and beneficial 2-week period at the logging school on the Fernow in Parsons, West Virginia. Not least among the benefits derived, was the opportunity to get acquainted with our co-workers at the other research centers.

Maintenance and improvements

Leaks in the roof of the equipment depot and the barn were repaired by replacing the valleys and flashings, which had badly deteriorated. The electrical system in the staff quarters was improved by the installation of several wall outlets.

Visitors

Inspection visits were made by Messrs. Sims, Cashion, and Nelson during the quarter.

QUARTERLY REPORT--LEBANON EXPERIMENTAL FOREST

October-December 1949

by S. Little

General

Activities during the past quarter were diversified. They included the revision or review of a few manuscripts, the establishment of a few small-scale studies, vacations, inspections, visitors, etc. Additional tests were made of poisoning upland oaks, and a test of the value of Good-rite Z. I. P. as a deer repellent was also started. In addition, four 1/40-acre deer exclosures were established, along with accompanying unfenced plots, in oak-pine stands that were cut 3 years ago.

Reproduction data obtained during the previous quarter on the annually burned plots were summarized. They provide further information on the value of cutting and prescribed burning in encouraging pine reproduction, as well as information on the effect of the past dry summer on this reproduction.

Annually burned plots in 1949

The amount of pine reproduction present in the late summer of 1949 increased with the number of prescribed burns before cutting. The unburned, but cut, plots had about 580 seedlings per acre; plots burned once, 800 seedlings; plots burned twice, 1000; plots burned three or four times, 1,925 seedlings; and plots burned 5 or 6 times, about 2,650 seedlings per acre. While the increase from burning is not so great as on the periodically burned plots at Mount Misery, the same trend is evident.

A shelterwood cutting or thinning of the oak overstory prior to burning also favored the establishment of pine reproduction. Where this cutting had been made, there is now about 40 percent more pine reproduction than in the areas where the stands were not thinned before burning. However, the increase from the shelterwood cutting was not as great as from burning--being of comparable size to the increase from one burn, but much less than the increase (230-350%) resulting from three or more burns.

Because of the dry summer, there was appreciable mortality of the pine reproduction during the past year. This amounted in the whole area to 31 percent. It was not affected by cutting or lack of cutting before burning, nor by the number of prescribed burns.

However, the mortality of pine reproduction was affected by the cutting after burning. On half of each plot the remaining oak overstory had been cut in the winter of 1946-47, and on the other half in 1948-49. Where the cutting was done last winter, the mortality since 1948 was 44 percent; where the cutting was done 2 years earlier, the mortality was 19 percent, or 25 percent less.

Seedlings that had started in the spring of 1948, or were 1 year old in the spring of 1949, suffered more than the older reproduction. In the areas cut last winter, 47 percent of the 1948 seedlings have died in the past year, compared to 28 percent of the older seedlings. In the areas cut in 1946-47, 22 percent of the 1948 reproduction and only 2 percent of the older seedlings died during the same period.

The chief cause of the high mortality during the past year was apparently the dry summer, and the very different rates of mortality among various groups of seedlings are attributed chiefly to their vigor. Thus, the seedlings that were at least 2 years old in the spring of 1949 and were growing under open conditions suffered little--on the average, only one out of fifty died. In contrast, one out of four seedlings of similar age died in the areas cut last winter, but these seedlings were not vigorous because they had been growing under shade. The 1948 reproduction was not so well established as the older seedlings, and hence more of them died in both types of area. Yet again, a higher proportion of seedlings died in the recently cut areas where the reproduction was not so vigorous as in the areas logged 2 years earlier.

The death of some reproduction in the areas cut last winter was probably due to logging damage, but the number so affected was apparently small. Because slash was removed from the plots, and because the oak wood was hand-loaded on trucks, most of the logging damage resulted from driving trucks over the area. However, nearly all the reproduction was less than 2 feet tall, and hence damage was confined to the wheel tracks. There a few seedlings were killed, but the number was small, apparently 5 percent or less of the total.

Mortality on the areas cut last winter was much higher than usually occurs. On the areas cut in 1946-47, only 17 percent of the pine seedlings then present had died by July 1947, compared to the 44 percent dying this last year under the same treatment. Furthermore, the mortality of 17 percent on cut-over areas in 1946-47 was only slightly more than the 15 percent found during the same year in the uncut parts of the same plots.

QUARTERLY REPORT--FARM FORESTRY RESEARCH
(Cooperative project in Connecticut)

October-December 1949

by R. H. Fenton

Primary processing

Mention was made in the 3rd quarterly report that trials of the portable wood chipper, made in Massachusetts, were assured. A review of the diary for the last quarter indicates that 85 percent of the time was devoted to planning and carrying out this study.

Due to the interest generated by the development of portable wood chippers, this study was considered of value to determine the potentialities of this equipment as a tool in forest management.

Most of the field trials have been completed as a cooperative project between this branch, the Connecticut Forest Service, and the Northeastern Wood Utilization Council. Other cooperators were invited, in part to provide funds for the work by actual purchase and use of the chipped wood.

The material that was chipped was all produced from early improvement cuttings in natural hardwood stands on the Natchaug State Forest. It was classified by the age of the stand from which it was cut--0 to 20 years and 20 to 30 years. As a general rule, all intermediate and lesser trees were removed whether or not such removal would benefit the remaining stand.

Time records were kept to determine the approximate man-hour requirements in making the material available to the chipper, which was mounted on a two-wheel trailer. All this material was limbed up but most of it left full length in which form it was manually fed into the chipper. Nothing larger than 4 inches in diameter was chipped, that being about the maximum size the machine could handle.

The actual chipping operation did not start until most of the material was already prepared. During the chipping operation, careful time records were kept on all phases and factors that had significance in determining the cost of chipping and the rate of production. The total cubic volume of all the chipped wood was measured and representative samples were weighed.

Some bad weather hampered the chipping operations, and more time was lost when the chipper was used for purposes other than this specific study. However, all the wood cut in the thinning and weeding operations was chipped before the machine was returned to the manufacturer who lent it.

The data collected has not yet been analyzed. Enough information has been gathered, however, to indicate that this type of machine can be useful in utilizing small trees for which there is no other outlet.

Of course, the utilization of wood in chipped form as produced by these machines has a great bearing on their value in forestry. Therefore, varying amounts of chips have been supplied, at a nominal price of \$5 per ton, to several different agencies such as the highway department, the agricultural experiment station, a paper-board manufacturer, a wallboard machinery concern, a heating equipment manufacturer, and others. They will evaluate their use as mulch, as a soil amender, in pulping and insulation board manufacture, as fuel, and as cattle bedding.

Kiln survey

A brief survey was completed to determine the total number of charcoal kilns in Connecticut. Information was also gathered, as far as possible, on the capacity of the kilns, type, and whether operating at present. The information was obtained partly by mail inquiry and partly from personal knowledge.

Other activities

In November, the writer was invited to take part in a forestry field day in Rhode Island, which he assisted in planning. He led the discussion on current methods of wood preservation that can be used by farmers, arranged for a Connecticut Christmas tree grower to talk on his experiences in that field, and arranged for a portable, jeep-mounted wood chipper to be demonstrated.

Late in the quarter, assistance was given on completing the census of lumber used in manufacture for 1948. Contacts made with industrial users in Rhode Island and Massachusetts reminded the writer of his experiences in the canvass of sawmills for lumber production.

QUARTERLY REPORT--ADIRONDACK

October-December 1949

by William Rutherford, Jr.

Poor logging weather

Cold weather and snow are generally topics for complaints but Adirondack woodsmen are complaining about their absence. Frequent thawing rains have prevented the construction of winter roads so important to logging in this area. There are no current logging operations on the Paul Smiths Experimental Forest, but neighboring jobs are far behind schedule.

Exploratory market studies

Markets for forest products very largely determine the refinement of forest practice. Particularly is this true for under sawlog sized material such as would normally be removed by thinning and improvement cuts.

Adirondack markets have been, and still are, extremely selective. Good sawlogs (both hard and softwood) and spruce and fir pulp are merchantable. Unfortunately our stands also contain beech, soft maple and other species for which no markets exist, as well as cull trees of desirable species which will not make sawlogs.

Logging tends to remove the better trees and leave the land in the possession of unmerchantable species. Some sort of stand improvement is essential before these lands will again produce high-quality forest products. Under existing market conditions this stand improvement would be of an investment nature.

Last summer the Adirondack Research Center began informal studies of marginal outlets for forest products. Thirty acres of spruce-yellow birch lands was chosen for these studies. This stand had been heavily cut for softwoods in 1917 and as a result of this cutting was composed chiefly of yellow birch, soft maple and beech. Some of the yellow birch was of sawlog size but was wolfish in character. Under these hardwoods, were small spruce and fir which needed release. The study objective was to remove all hardwood trees which would pay their way out of the woods, and to investigate all possible marginal markets.

The first phase of the study removed all yellow birch which was merchantable for sawlogs. There was no problem in finding a market for this type of material but the stand's low board-foot volume (about 1 M per acre) did pose a problem. However, a contractor was found and the logs cut and delivered. The net stumpage return was \$23.00 per thousand.

The next phase of the study was the production of cross ties and an order for 300 ties, or one carload, was obtained from the New York Central Railroad. Acceptable species were beech, birch, and maple. Arrangements were made with a local mill for custom sawing and our regular contractor agreed to do the logging, hauling, and loading. An analysis of prices and costs is shown in table 1.

The yield per acre amounted to four cross ties and 50 board feet of side lumber. This low yield was due to the prevalence of rot, frost cracks and seams which culled many of the tie sized trees. To complete the order it was necessary to cut about 180 ties on another area.

Side lumber proved very important to the financial success of the study. Total yield amounted to 5,057 B.M. of which 3,700 B.M. of No. 2 Common & Better yellow birch and cherry was sold for \$90.00 per M at the mill. A statement of expenses and income is shown below:

INCOME

Received for 234 ties	\$ 409.40	
Received for 3,700 B.M. side lumber	<u>333.00</u>	\$742.40

EXPENSES

Logging 17,287 B.M. at \$30.00/M	518.61	
Sawing 17,287 B.M. at \$10.00/M	<u>172.87</u>	691.48
Return to stumpage (\$2.95/M)		\$ 50.92

Although this operation shows a net return to stumpage, it was not profitable either to the sawmill operator or the logger. This was due jointly to the defective nature of our timber and to inexperience in tie manufacture. Some findings of the study were: (1) tie timber must be sound and uniform in size for maximum profit; (2) a good sawyer at the mill can make or break the job; (3) tie logs with sweep should be sawed into pole ties; (4) close supervision in the woods is essential to insure that all tie cuts are exactly 8 feet 6 inches long; (5) marginal products can best be produced by a forest employed crew, not by a contractor.

The hardwood pulp market was next investigated. Two New York mills, one at Ticonderoga and one at Mechanicsville, use hardwood pulp. However, their demands are largely filled by nearby farmers and small independent cutters. The price for peeled hardwood pulp delivered at Ticonderoga is \$20.00 a cord. Although this market will be marginal, we hope to deliver some wood in 1950. We ran some tests on the comparative ease of peeling yellow birch, soft maple, and beech. Both yellow birch and soft maple are easier to peel than spruce but beech is quite difficult. It was found that tree length peeling was faster than bolt peeling, particularly with yellow birch and soft maple.

Table 1.--Analysis of prices and costs in filling
New York Central order for railroad ties

Item	Tie class (Length: all 8'6")					
	#5	#4	#3A	#3	#2	#1
Dimensions	7x9	7x8	7x7	6x8	6x7	6x6
F.o.b. price	\$ 2.10	\$ 1.85	\$ 1.60	\$ 1.35	\$ 1.15	\$.90
Board feet	45	40	35	34	30	25
Price per M.bd.ft.	\$46.66	\$46.25	\$45.71	\$39.70	\$38.33	\$36.00
Logging cost at \$30.00	1.35	1.20	1.05	1.02	.90	.75
Sawing cost at \$10.00	.45	.40	.35	.34	.30	.25
Stumpage return	.30	.25	.20	-.01	-.05	-.10

The study's final phase was a fuelwood operation. The sale of waste products from two bobbin mills in Tupper Lake and slabwood from nearby sawmills compelled us to concentrate upon fireplace wood cut to order for the luxury trade. Several small orders for wood were obtained from the summer campers, the largest of these amounted to 27 cords. Our table of prices is shown below:

14" wood - \$ 9.00 per face cord delivered
 22" wood - \$11.00 per face cord delivered
 36" wood - \$15.00 per face cord delivered
 48" wood - \$13.00 per cord along the road (orders of 10+ cords)

Cutting, skidding, and splitting was done by a crew employed by Paul Smiths College. This operation showed a slight profit but failed to remove many of the undesirable trees from the stand. Buyers preferred split wood over round wood; and limby top logs and small poles were uneconomical to split.

Despite the efforts of this study to remove all marginal products from the stand, only partial release of young softwoods resulted. This emphasizes the importance of developing some cheap effective way to kill cull and weed trees.

Visitors

H. P. Price of TVA, Anthony P. Dean, Ira J. Mason, L. I. Barrett, B. H. Payne, and Fred Simmons of the Forest Service visited the Branch while making an inspection of the Wyssen Cableway owned by Finch-Pruyn & Company on October 14.

On October 7 the Adirondack Chapter of the New York Section, Society of American Foresters, met at Paul Smiths and reviewed activities

at the College and on the Paul Smiths Experimental Forest. About 20 members attended.

Dr. E. L. Stone of Cornell University, Pack Professor of Forest Soils, spent two weeks at the Finch-Pruyn Experimental Forest in late September and early October. Dr. Stone is cooperating with this Adirondack Branch on several projects.

QUARTERLY REPORT--ANTHRACITE

October-December 1949

by C. F. Burnham

THE POCONO EXPERIMENTAL FOREST

Cutting practice level plots

The removal of timber from the cutting practice level plots continues, but at a low ebb. Continued uncertainty and curtailed production in the anthracite mines has made the marketing of the final few hundred tons difficult. At this writing no relief from this condition appears on the horizon. It may be necessary to terminate the present cutting contract with only 6 of the 8 plots cut over. This would mean postponing the removal of timber from one "high order" and one "good" plot until the market improves.

The stumps treated in July with ammate and Weedone Brush Killer 32, as described in the last quarterly report, were examined in October. Nearly all sprayed sprouts and suckers had been killed. With the ammate notch treatment, practically all stump sprouts had been killed, but only about half of the beech root suckers. At least 12 beech saplings and larger trees, though not treated directly, had been injured and probably killed, apparently by translocation of ammate through root connections with notch-treated stumps.

The efficacy of the treatments in killing the stumps themselves, or at least weakening them enough to prevent vigorous sprouting and suckering, will not be known until next summer.

Compartment management studies

The report for the quarter ending in June contained the study area allocation plans for the Pocono Experimental Forest. Plans for compartment management or pilot-plant studies have further progressed so that they can now be presented. As reported in June, 30 compartments have been allocated to these studies which will evaluate methods of cutting and management designed to bring the northern hardwood forest type, as it occurs in the Anthracite Region, to its maximum productivity as to quality, quantity, and financial yield. To accomplish this several different systems of silviculture, quantities of growing stock, levels of cutting practices, and lengths of cutting cycle will be studied. Eighteen of the compartments will be used for testing the integrated production of saw timber and other products. The other 12 will be used for studying the production of mine timbers and similar bulk products principally, but with other products to be harvested as they occur. The following tables summarize these plans:

Table 1.--Integrated production of saw timber and other products

Silvicultural system	Cutting practice level	Quantity of growing stock	Length of cutting cycle	Compartments	
		Bd. ft. per acre	Years	Number	Acres
Individual tree selection	High order	6,000	4	2	85
"	High order	6,000	8	2	79
"	High order	8,000	4	2	72
"	High order	8,000	8	2	76
"	High order	10,000	4	2	82
"	Good	4,000	12	2	78
"	Good	6,000	12	2	82
"	Good	8,000	12	2	75
11" diam. limit	Fair	--	20	2	88
Total	--	--	--	18	717

Table 2.--Production of mine timbers or other bulk products

Silvicultural system	Cutting practice level	Length of cutting cycle	Compartments	
		Years	Number	Acres
16" diam. limit	Good	8	2	71
8" diam. limit	Poor	over 20	2	54
3-cut shelterwood	Good	--	2	59
Clear-cut in progressive strips or blocks ^{1/}	Good	--	2	56
Clear-cut in progressive strips or blocks	Fair	--	2	56
Areawide clear-cut	Poor	--	2	52
Total	--	--	12	348

^{1/} Strips or blocks to be cut at 5-year intervals on a 40-year rotation.

REGENERATION STUDIES

by W. E. McQuilkin

Scrub oak conversion

Survival tallies for the plantings on the Game Lands and Bear Creek Areas, which had just been completed at the time of the last quarterly report, have since been analyzed in more detail. The following tabulation shows survivals by species and class of stock for each place.

Species and class of stock	Planted at each place Number	Survival	
		Bear Creek Percent	Game Lands Percent
Locust 1-0	600	92.3	95.2
Red oak 1-0	600	89.2	96.7
Eur. larch 2-0	300	48.0	78.3
Norway spruce 3-0	150	63.2	86.0
Norway spruce 2-2	300	83.0	97.0
Red pine 2-0	150	73.9	90.0
Red pine 3-0	300	77.0	93.7
Red pine 2-2	150	86.7	98.0
White pine 3-0	300	73.0	83.7
Scotch pine 3-0	300	89.3	92.3
Jack pine 2-0	300	84.0	93.7
Pitch pine 2-0	300	56.0	61.7
Totals and means	3,750	78.9	89.7

Poor drainage is believed to be the explanation for the consistently poorer survivals at Bear Creek. This area was extremely wet at the time of planting, and some trees actually were set in saturated soil. The comparatively low survivals of pitch pine are to be explained in these plantings, as in the 1948 plantings at Pimple Hill, by poor quality of planting stock. The reason for the much lower survival of European larch at Bear Creek than on the Game Lands is uncertain, but probably lies in some unusual sensitivity of the species to the site and drainage conditions.

Some small tests in direct seeding of red pine, pitch pine, and Japanese larch are showing very good catches for the two pines, but poor results with the larch. One hundred spots of each species were sown in the bull-dozer furrows on the Game Lands, and 80 spots of each in the year-old Killefer plow furrows at Pimple Hill. The sowings were made in May 1949; percents of stocked spots in September were as follows:

	<u>Game Lands</u>	<u>Pimple Hill</u>
	(percent)	(percent)
Red pine.....	73.5	95.0
Pitch pine.....	98.0	97.5
Japanese larch.....	39.0	48.7

One half the spots were protected with hardware cloth screens, but no significant differences in percents of stocked spots were associated with this treatment. With the late spring sowing of stratified seed, germination and emergence evidently occurred so promptly that rodents had little opportunity to molest the seed.

MISCELLANEOUS

The fall meeting of the Anthracite Area Forest Research Advisory Committee took place on October 20 at the Pocono Experimental Forest. Progress on the scrub oak conversion project and research development plans for the Pocono Experimental Forest were presented and discussed before lunch. In the afternoon the group visited the cutting practice level plots, and several other compartments that have been prepared for cutting. The meeting adjourned at the site of the new Columbus deep-notch weir and gaging station after a presentation of the water run-off studies by Herb Storey of the Delaware Basin Research Center. In addition to members of the committee several guests were present, including representatives from the Glen Alden Coal Company, Morris Lumber Company, Pa. State Game Commission, Pa. Dept. of Forests and Waters, Lehigh Coal and Navigation Company, Interstate Commission on the Delaware, Scranton Spring Brook Water Company, and the Northeastern Forest Experiment Station.

QUARTERLY REPORT -- BELTSVILLE EXPERIMENTAL FOREST

October-December 1949

by Francis M. Rushmore

Cutting-practice-level plots

The search for a cooperator to cut our CPL plots lead from the consumer mill, through their local purchasing agent, then to the man who will furnish the crews to do the work for us. He is Mr. Stewart of the Apex Wood Products Co., Baltimore. The cutting crews work for him under contract.

Stewart looked at our pine stand on October 12 and made several offers which varied with the quantity of work he would be required to do. The offers were:

1. Pay \$14 per cord, loaded on freight cars.
2. Pay \$ 3 per cord stumpage and leave any trees designated by us.
3. Pay \$ 1 per cord for the 451 cords of wood and pile the slash on half of the 20-acre area.

Although the processing of the cooperative agreement has not been completed, it appears that we may accept the \$3 offer and pay for the brush piling out of the cooperative fund. In November we received a letter from Mr. Stewart in which he said that he would be unable to take the 11 cords of hardwood in the stand. He had received word from the consumer mill that they had temporarily discontinued accepting hardwood.

Sims inspected the sample markings of the plots on December 4 and instructed us to complete the marking. The marking has been completed and photographs of the plots have been taken, so cutting may proceed when the cooperative agreement has been approved and signed. It is hoped that operations can be completed before spring so that the stands may have the benefit of last year's seed crop.

Planting in the ashes of burned slash piles

In this study three species were planted during April 1949. Planting was done on (1) spots where 50 pounds of slash had been burned (2) where 100 pounds of slash had been burned, and (3) where only one-foot-square scalps were removed. Loblolly pine and tulip poplar 1-0 stock were planted. The hybrid poplar cuttings were from 1-year-old stems and were 12 inches long.

The average height growth, in feet, for the period April 26-October 24, 1949, was as follows:

<u>Slash burned</u>	<u>Hybrid poplar</u>	<u>Tulip poplar</u>	<u>Loblolly pine</u>
100 pounds	2.7	0.3	1.0
50 pounds	2.5	.3	.6
None	.5	.1	.5

A complete analysis of the study will not be made until the end of the second growing season after planting.

Experiments established prior to 1945

Numerous small pine plantations were established on old fields within this forest prior to 1945. Most of them were intended to supply information of a physiological nature within several years after planting. A review of the work plans and establishment reports revealed that only a few of the plots require further examination.

Close spacings frequently were used in planting. We plan to salvage some of the plantations by thinning them. This will give us small blocks of white, red, and loblolly pines for demonstration purposes.

Frequently Virginia pines established themselves in plantations and have grown more rapidly than the planted white or red pines. Although the white pines grew slowly for the first 3 years after planting, they are now growing rapidly and probably would have no trouble competing with the Virginia pine if both had similar spacing.

A characteristic of Virginia pine was observed and will be kept in mind if we plan to remove them in cleanings. On an area where red pines were being planted in 1942, Virginia pines about 6 years old had been cut. Even though the stumps were not over 3 inches high, there are now 2 to 4 stems growing from each stump. They overtop the red pine. It is not known whether these stems developed from buds or from branches already present at the time of cutting. I had not previously suspected that Virginia pine would do this. Individual trees with a crotch near stump level are rarely seen on our forest.

Treatment of a young Virginia pine stand

In 1944, under supervision of T. E. Maki, trees to be used in a test of several treatments were selected in a 9-year-old Virginia pine stand. The major purpose of the study was to test the effect of high-analysis nitrogen fertilizer on the growth of crop trees. Treatments for the 280 fertilized trees were: (1) pruned and released (2) pruned

(3) released (4) fertilized only. Treatments for the 40 trees which were not fertilized were similar to those listed above. The trees were remeasured in December.

The preliminary analysis indicates that there has been only slight benefit from fertilizing. The average increase in diameter during the 6 years was less than 0.5 inch greater for the fertilized trees. The height growth was nearly the same for the fertilized trees as it was for the unfertilized trees.

In addition, the tentative analysis indicates the following:

1. Dominants grew more rapidly in both diameter and height than co-dominants or intermediates.
2. Dominants can be identified in stands that are less than 15 years of age.
3. In young stands only dominants and co-dominants should be selected for crop trees.
4. About half of the pruning wounds are completely closed.
Healing was more rapid from the stump to 4 foot heights than it was higher where larger, live limbs were pruned.

Roads and trails

During the early part of the fire season all roads and trails passable for vehicles were inspected and cleared of fallen trees. Gravel was placed on several trails where the graveling of short stretches would make the entire trail passable in wet weather. One wooden culvert was replaced with tile.

All gravel was loaded with a No. 30 McCormick-Deering Power Loader attached to our Farmall tractor. The loader worked best in gravel that had first been loosened with a bulldozer. Although made for loading manure, the loader has been adapted for gravel by adding only three steel braces. It has saved considerable hand labor.

We have begun the placing of trail number signs. Each one is 6 x 5 x 1 inches in size and has only the trail number on it. They will be useful for administrative and fire protection purposes by those persons who have a copy of our road map.

Trespass on the forest

About 1 cord of oak was cut and removed from our land in December. Part of the wood was found in the yard of a local resident. He was considered to be a reasonably innocent trespasser; the wood presumably was sold to him as stumpage.

Before Christmas 52 white, red, and loblolly pines were taken from our plantations. This was not a single operation. The trees were removed a few at a time. Several were traced to Agricultural Research Center personnel who claimed that they thought they were on ARC land. (ARC personnel had been given permission to cut trees on their land.) The tops were cut out of 58 other red pines. Only about 14 inches of the top was taken from each of the five-foot trees. Nearby signs did not deter the trespassers.

Other activities

Broomall and Rushmore spent a profitable two weeks attending the logging school at Parsons.

A series of photographs was completed for the Virginia pine thinning plot at Cedarville, Maryland.

Height measurements of 17,500 hybrid poplars were obtained.

About 40 man-hours were required to obtain and deliver Christmas trees and holly for the Washington Office and the Department of Agriculture. Each year we furnish a 20-30 foot tree for the North Agriculture Building in Washington. For the last 2 years we have selected well-formed, open-grown Virginia pine.

Maintenance

The efforts for the last few years to maintain the flow of water from our well have come to an end. A set of impellers, were dropped to the bottom of the 380-foot well about 6 years ago, are now so firmly packed with sediment that a 20-ton force applied for about 8 hours moved them only 8 inches. A coupling on a 3/4-inch rod broke loose and there is nothing to get a secure hold on now. The well men knew of no remedy that has a reasonable chance for success and still would be reasonable in cost.

The salvageable metal from our fire was sold for \$611. For the salvage and the cleanup of the area, the bids ranged from \$331 payable to us, down to \$250 payable to the contractor. For the metal only, the bids were \$611 payable to us, down to \$100 payable to the contractor. The high bidder was aware that at least 25 other persons might submit bids.

A permanent shelter was built for the Pacific pump at our pond. It is the best method we have, at present, for fire protection.

Visitors

Sims and Cashion spent a week end with us to discuss fiscal and forest-management matters.

Messrs. Munster and Banberg of the Budget Bureau, Grant from U.S.D.A., Barrett and Larrimer from Forest Service, Washington, and Schreiner were here to discuss budget matters pertaining to losses caused by the fire last July.

Schreiner has been here several times to work with his poplars.

The following members of Osborne's statistical methods course spent a day here touring the forest, Patuxent Wildlife Refuge, and the Agricultural Research Center: Banks, Northeastern Station; Barrows, Missoula; Deitschman, Central States; Hartong, California; and Lindenmuth, Southeastern.

Porfirio San Buenaventura, Chief, Administrative Div., Bureau of Forestry, Philippines was here to get a general idea of our work.

R. K. Dodson, Forest Service, Tallahassee, Florida, was here to discuss and observe general phases of our work.

QUARTERLY REPORT -- DELAWARE BASIN

October-December 1949

by Irvin C. Reigner

WATERSHED STUDIES

Periodic tests of water quality were initiated during the quarter at the Dilldown Watershed Unit and at the Pocono Experimental Forest. Turbidity, water color, and bacteria content are the factors of water quality under observation. Turbidity has been generally low at both watersheds. Water color has been quite low at Dilldown, but higher at Pocono. The difference is apparently due to a difference in the swamps through which the creeks run. At Dilldown, the swamp has a relatively complete forest cover, while at Pocono the swamp is grassy.

It was found that color increases during periods of high streamflow, at which time a greater area of swamp is flooded. During periods of freezing weather, at which time the swamp was frozen, the color fraction at the Pocono has been noticeably lower.

Bacteriological analyses of the water from both streams show a low content at Dilldown, somewhat higher at Pocono.

Rainfall and streamflow

In past reports we have pointed out month-by-month relationships between rainfall and streamflow on the Dilldown Watershed area. Generally, rainfall for the month was greater than the amount of water that passed through the streamgaging station, indicating a high water loss by evapo-transpiration and/or an increase in groundwater storage.

A few months, however, showed the opposite relation: streamflow greater than rainfall. In this case, the groundwater reservoir supplied most of the streamflow. Groundwater levels fell during these months.

With the completion of our first hydrologic year (October 1, 1948, to September 30, 1949) we are now able to give a complete picture of these relationships throughout the hydrologic cycle. In general, groundwater levels are at the lowest point at the beginning of the year, increasing from then on until the growing season. During the growing season, the latter half of the hydrologic year, groundwater levels again recede until the cycle is complete. Most rainfall during this period is used to replenish soil moisture deficiencies caused by evapo-transpiration; very little rainfall percolates through to groundwater level.

Streamflow follows a similar pattern, being generally highest when the groundwater level is at its maximum.

Precipitation, streamflow and groundwater levels are shown in the following table:

Table 1.—Hydrologic year Oct. 1, 1948 to Sept. 30, 1949,
on Dilldown watershed

Month	Precipitation inches	Streamflow inches of water over watershed area	Groundwater levels, ave. monthly height above mean sea level	
			Well #1	Well #2
October	0.79*	0.33		
November	5.75	0.93		
December	5.29	2.03	1885.8	1882.4
January	4.80	4.50	1892.3	1890.1
February	3.09	2.78	1890.5	1887.7
March	1.52	2.22	1888.1	1886.6
April	5.19	3.20	1890.2	1886.4
May	7.27	4.52	1892.0	1891.0
June	1.02	1.16	1886.1	1886.6
July	4.12	0.64	1881.2	1882.0
August	6.06	0.64	1877.9	1878.0
September	4.02	0.51	1876.9	1875.5
Total	48.92	23.46	Ave. 1886.2	1884.6

Total water loss by evapo-transpiration - 25.46"

Peak flow - May 7, 12:30 a.m. - 79 c.f.s.

* - Oct. 17-31, inclusive.

Total rainfall for the year is slightly higher than the average annual rainfall for the general area in which Dilldown watershed is located.

The total water loss of 25.46 inches is high for the region. Water loss, however, fluctuates widely from year to year, depending on the seasonal distribution of rainfall and the size of individual storms.

Since most summer rainfall is used to replenish soil moisture losses, only a small portion goes into streamflow. Thus, high summer rainfall tends to increase total water loss. It may be noted from the table that July, August, and September had relatively high rainfall with low streamflow. Groundwater levels dropped during this time, indicating that the water table received little or no part of the rainfall. A large part of the total water loss occurred during these three months.

Large, high-intensity storms will increase streamflow, of course, even during the growing season. On the other hand, the larger number of small storms, such as occurred this year, helped to increase water loss.

As an interesting side light, the following tabulation indicates the condition of the groundwater reservoir at the watershed:

Height of groundwater above mean sea level

	<u>Well #1</u>	<u>Well #2</u>
Dec. 13, 1948	1884.8	1881.7
Dec. 13, 1949	1885.2	1880.8

The latter figures, taken from the present year's records, show no change from the previous year.

Installations

A third rain gage was installed at the upper part of the Pocono watershed to test the variation of rainfall throughout the watershed area. Another rain gage was installed in the northern part of the Dill-down watershed. Better coverage of the rainfall pattern on the watershed will be obtained with this addition.

SCRUB OAK CONVERSION - DELAWARE-LEHIGH EXPERIMENTAL FOREST

Natural regeneration

A secondary experiment on the encouragement of natural regeneration was established as an adjunct to the mechanically disturbed strips described in the preceding report. The effect of soil acidity will be tested by the later experiment.

Observations of soil acidity, particularly on strip mine spoil banks, indicate that pH is a limiting factor for the establishment and growth of vegetation. Values from 3.5 to 4.0 were found to inhibit any form of desirable vegetation. Since pH values on the area selected for the strips range between 4.1 to 4.8, it is possible that natural regeneration of pitch pine is inhibited, or at least discouraged, by the high acidity.

To test this possibility, parts of three adjacent strips were treated with hydrated lime, applied in an amount to lower the acidity to pH 5.0 to 6.0. Natural regeneration on this treated area will be compared with that on the untreated part of the strips, both, in turn, being compared to the natural regeneration in the undisturbed scrub oak.

Plantings

So that realistic cost figures for a large-scale conversion project may be available, particularly for the future conversion of the watershed area, plans have been made to plant an area of approximately 50 acres in the spring of 1950. The site, lying outside of the watershed proper, will be prepared by a D-7 Caterpillar tractor equipped with an angledozer blade. With the blade tilted to the maximum degree possible, a strip 3 to 4 feet wide will be furrowed for planting. Previous usage of this method indicates that furrowing will proceed at a rate of $3/4$ acres an hour or better.

Planting of several species in strip-wise arrangement will follow immediately, using the mattock slit technique.

The equipment, trees, and planting crew will be provided by the Pennsylvania Department of Forests and Waters. The project will be supervised by W. E. McQuilkin of the Anthracite research center with additional technical personnel provided by the Delaware Basin research center.

The results of further analysis of the fall examination of the plantings at the Dilldown area are:

1. Second-year mortality for the softwoods averaged about 5% but was much higher among the hardwoods.
2. Hybrid poplar had the highest second-year mortality, 35%. Present survival is less than 50%.
3. Second-year mortality of European larch was extremely low--less than 1%.
4. Fertilization of black locust has resulted in a significantly greater growth; many individuals are now above the scrub oak.

Direct seeding

Small-scale tests of direct seeding were made in available plowed space to provide some indication of the reliability of this method of establishing desirable vegetation on scrub oak sites.

Fall examination indicates success with red and pitch pine seedings, but larch and the oaks (red and white) gave rather poor results. Failure of the oaks may have been due to injury and deterioration of the acorns before planting.

SOILS

Soil moisture units were installed at two more sites during the quarter. Thus, we are now gathering soil moisture data at three sites which differ in soil composition and rock content. A duplicate set of units is installed at one site as a check on the variability of moisture conditions at one place.

When we are finally able to obtain a complete picture of soil moisture conditions throughout the watershed, we shall be able to determine: (1) The amount of water held in the soil mantle at any given time, and (2) the amount of water lost by evaporation from the soil and by vegetative transpiration. Both factors are important components of our rainfall-streamflow relations.

Evapo-transpiration determinations will be possible during periods between storms at which time soil moisture will be decreasing. After a storm the soil will lose water downward into the groundwater reservoir only until field capacity of the soil is reached. Thereafter, water loss is upward, by evaporation and transpiration. Water losses beyond field capacity, therefore, may be attributed to a combination of these two factors and can be measured.

The determination of water storage in the soil is complicated by the high proportion of rocks therein. Since rocks hold little or no water in comparison to the water held by the surrounding soil, an estimate of the amount of rocks in the soil must be made. Bethlahmy has been studying this problem during this quarter, sampling the soil column at various places and determining the percentage of rocks in each horizon.

Volume weight of the various soils and of each horizon is another necessary factor in the determination of soil moisture relations. Samples have been taken extensively and volume weight data are now available. It is interesting to note that changes in volume weight occur with changes in the amount of water held in the soil. Fortunately, the two variables are well correlated and it is possible to estimate volume weight at any moisture content.

The soil survey was completed during the quarter. The area is comprised of four distinct types of soils, roughly divided as follows:

1. Swamp and poorly drained soils	200 acres
2. Soils derived from sandstone, high rock content	870 "
3. Soils derived from sandstone, low rock content	630 "
4. Soils derived from shale	100 "

The presence of an A₁ Horizon, indicating a mull soil, was noted in several limited areas.

VISITORS

Bevan, Westveld, and Bickford spent a day with us conferring on the work plan for the large-scale planting project and on the detailed work plan for the Dilldown Watershed Unit.

Mr. Colen G. Lennox, President, Board of Agriculture and Forestry, Territory of Hawaii, visited the office and made a tour of the Dilldown installations with Storey.

QUARTERLY REPORT--MOUNTAIN STATE

October-December 1949

by Carl J. Holcomb

Fernow Experimental Forest

Logging is within two weeks of completion of the 4 cutting-practice-level plots. All logging to date has been done with the D-4 Caterpillar and karry kart. Most of the recent skidding has been done in tree lengths. To date, each of the compartments appears to have paid or more than paid its way. Within three weeks volume and cost data on the CPL plots will be ready for preliminary analysis.

In spite of the lay-offs in the coal mines and consequent loss of markets for mine timbers from time to time, our cooperator has continued to operate his mill every day. He has added an edger and is planning to extend his dock and increase the number of pile bottoms for lumber. Thus, he will now be able to turn out a better product and will also be able to hold his lumber for the preliminary drying period.

The preliminary measurements for a soil-erosion study on skid roads have been taken. Although this is not planned as a comprehensive study, it will be the first study undertaken in this area to determine the effects of various logging methods on skid-road erosion.

The first section of a fully developed road system for the Fernow is now being built. The right-of-way for Rock Camp Spur road has been cleared in preparation for grading. Logging school students will remember this right-of-way as the place where they did their practice logging.

Logging school

The first known logging training school for experimental forest managers was held at the Fernow Experimental Forest on November 6-18. Men from 7 research centers attended. Classroom and sleeping quarters were set up in the Parsons Nursery Washhouse. Meals were contracted for at a restaurant in Parsons.

Fred Simmons, Hank Sims, and Ken Clark were the permanent "professors." Several other experts were called in for instruction in special subjects.

While the main purpose of the course was to instruct personnel in the care and handling of logging equipment, the element of safety was a part of every subject and every training session. Seth Jackson, from the Chief's Office, was the first speaker. He briefed us on the need for safety and ways to maintain a good safety record. His practical demonstrations, particularly with hard hats, were very convincing. Seth stayed with us for 3 days as "safety inspector" for much of our woods training work.

The Paulson-Webber Cordage Company sent one of its sales representatives and an expert wire rope splicer to the school. The field of wire rope use was covered and a demonstration of wire rope splicing given at the first training session. The next day every man had an opportunity to make one or more splices for himself.

Several days were spent in the woods on the use of hand and power tools under the expert guidance of Hank, Fred, and Ken, who taught approved methods of swamping, felling, bucking, skidding, and deck building. One day was given over to the layout of logging roads.

Charlie Lockard and George Doverspike spent 2 days at the school introducing the men to log and tree grading. After an evening session on the principles of log grading and the identification of defects, the men went out into the woods to do the actual grading on the logging operation. Since log grading will have such an important role in our future work, this session was considered a very important one.

Lynn Correll came in from the Regional Office to talk on personnel management. He went into the basic needs of workers and the problems of handling men. After his formal session, there was a round-table discussion on the problems of hiring men and the interpretation of regulations. Every one felt that Lynn's visit was one of the highlights of the school.

Hank lead a seminar on cooperative agreements one evening in which he outlined the evolution of cooperative agreements as an instrument of research and spoke at length on the principles underlying such agreements. The discussion afterward was one of the longest of the school. Hank did a swell job with this difficult subject. Every one felt afterward that he was beginning to understand cooperative agreements.

During the first weekend there was an old-fashioned sawing and chopping contest in which every one participated. Bill Rutherford won the woodsmen's decathlon. Art Hart took second prize--an ax-tie pin clasp.

Probably one of the things the men will remember most about the school was the high quality of the food served by Flossie Funkhouser at the City Restaurant in Parsons. She not only maintained a high standard

of quality throughout the school, but on the last evening served a banquet dinner complete to the last degree.

When the school wound up on November 18, everybody agreed that the school had been well planned and that they had learned a lot from the 2 weeks spent on the Fernow.

Staff and Students at the Logging Training School

Staff

I. H. Sims	NEFES
Fred Simmons	"
Kenneth Clark	"
Seth Jackson	Washington Office
Lynn Correll	Regional Office
Charles Lockard	NEFES
George Doverspike	"

Students

William Rutherford, Jr.	Adirondack
Lester B. Cornelius	Anthracite
Stanley M. Filip	"
Ralph P. Broomall	Chesapeake
Francis Rushmore	"
Willis T. Borneman	Hopkins
Frank E. Cunningham	"
Carl R. Barr	Mountain State
Carl J. Holcomb	"
Arthur C. Hart	Penobscot
Thomas W. McConkey	White Pine
Sumner F. Ricker	" "
Victor S. Wilson	Winnepesaukee
Robert W. Wilson, Jr.	"
Thomas G. Clark	Mountain State

Meetings

Arthur Bevan spoke on Forest Influences at the Annual Chapter meeting of the West Virginia Chapter of the Soil Conservation Society of America at Jackson's Mill. The theme of the meeting was water. Other leaders in the field of hydrology and influences were on the program. Holcomb completed his year as Chairman of the West Virginia Chapter at this meeting.

Personnel

Sid Weitzman, center leader, returned from his 12 weeks training at the statistical school in Washington, D. C.

QUARTERLY REPORT--PENOBSCOT

October-December 1949

by T. F. McLintock

Experimental forest

Ten miles of the experimental forest boundary have been surveyed by staff compass and chain since September. The locations of all corners and lines for map-making purposes were computed by the latitude and departure method, thus giving every corner a set of coordinates. Coordinates for all points of the road and trail traverses also were computed by the latitude and departure method. All roads and trails were tied in to corners, and closing errors were distributed so that final coordinates agreed.

The corners, boundary lines, roads, and trails traversed have all been plotted on our office map at a scale of 1 inch equals 20 chains. About $16\frac{1}{2}$ miles of roads and trails are now plotted.

The remainder of the experiment forest boundary will be surveyed this winter. Certain sections of the boundary, such as the stream and lake forming the eastern edge of the area, can best be surveyed after they are solidly frozen over.

A cruise of the experimental forest was started in October and continues sporadically as weather and manpower permit. Cruise lines are spaced at 5-chain intervals with fifth-acre rectangular plots centered every six chains along the lines. This gives a cruise of approximately 6.66 percent. However, where large areas are covered by alder swamp and marsh grass no plots are established, and cruise lines are discontinued.

A type map is being made as the cruise progresses. This type map will be transferred later to a large-scale map of the experimental area drawn to a scale of 1 inch equals 5 chains. Cruising will continue all winter as weather permits and it is hoped that much of the area will be completed by spring.

Negotiations are now under way for a cooperative arrangement with the Bureau of Entomology and Plant Quarantine relative to their taking aerial photos of the experimental forest area next summer. These negotiations will doubtless be settled satisfactorily in the near future. The Bureau of Entomology and Plant Quarantine will be taking aerial photos in northern Maine next summer in conjunction with aerial spraying of the budworm infested areas, and hence will be favorably located for taking photos of the experimental forest.

Both black-and-white and color photos will be taken of the area, although the color pictures will not cover the entire forest. The color photos will be used only experimentally for species identification, type delineation and identification, and any other uses which can be discovered. It is planned that the pictures will be made on a scale of 1 inch equals 10 chains, or twice the conventional scale.

—W. J. Kidd, Jr.

Budworm experimental cutting areas

Summary and compilation work on the 260 permanent sample plots established on budworm cutting areas has occupied considerable time this quarter. Original stand tables are being reconstructed from stump measurements and percent of cut is being calculated for each plot. In addition to per-acre volume and basal area figures, average d.b.h., budworm vulnerability rating, relative density, and composition index are being computed. When plot summaries are completed the plots will be stratified in terms of type, site, and original spruce-fir volume. The pattern of basal area in cut and uncut stands as well as distribution of basal area by diameter classes or diameter class groups will then be studied as one phase of the effort here to establish the identity of that elusive element, "normal stocking", for various kinds and conditions of spruce-fir stands.

Budworm damage appraisal

The fifth annual inspection of the heavy budworm epidemic in the vicinity of Forbes Depot, Quebec was made this fall. On the basis of last year's inspection it was anticipated that by this year fir would have sustained a 50 percent mortality, and ocular estimates seemed to bear this out. At least 70 percent of the fir appeared dead, but closer examination showed that actually over 70 percent of the fir still had green cambium and new buds. Counts of dead trees made in this area showed an average mortality of 30 percent among trees in the one- to three-inch class, and 19 percent for trees four inches and larger. Mortality of white and black spruce was less than one percent.

On the Lake Larouche experimental area similar counts were made on 23 permanent plots. Mortality here averaged 28 percent. Remeasurements of 135 fir and white and black spruce sample trees showed only 5 percent of the fir had increased in diameter since last year, as compared to 58 percent of the spruce.

In general, high-vigor, rapidly growing fir sustained less damage than slower growing trees, and showed promise of quicker and more complete recovery by reason of more and better crops of new buds. High crown ratio, usually associated with rapid growth of fir, was also associated with low mortality. Fir growing on wet sites has suffered higher

mortality than fir growing on well-drained or moist sites. Young fir stands growing under a closed canopy of hardwoods had sustained virtually no mortality and much less defoliation than was observed for fir in softwood types. No other correlations between mortality and site or stand factors were observed.

Examination of twigs and needles for cast pupal cases and empty egg masses disclosed very few of either. It appears that the epidemic may show a marked decline in this area in 1950. Even if this should be the case, however, wood borers and bark beetles, which are very active in 80 percent of the dead fir, may constitute as serious a threat to the weakened fir as the budworm itself.

Progress of regeneration on burned areas

An examination of the 320-acre airplane seeding experiment on St. Regis Paper Company land in Washington County was made in November. On the basis of survival counts, the attempt to establish white pine seedlings by this method has been a failure. As indicated in the table, present stocking on the airplane-seeded tract is no greater than stocking of natural pine reproduction on control plots. While the somewhat greater apparent success of pine on hand-seeded plots indicates that part of the dismal showing of the experiment may be due to inadequate sampling of the area, there is no reason to think that a greater number of plots would materially change the picture. Casual observations made while walking across the seeded tract showed very few pine seedlings.

Summary of pine seedling counts on airplane seeding experiment, at end of second season

Item	40 hand-sown plots	40 air-sown plots	40 control* plots
Stocked milacre plots:			
Number	8	2	2
Percent	20.0	5.0	5.0
Tot. number seedlings germinated			
1948	12	7	2
Number seedlings surviving 1949 . . .	10	2	2
Percent mortality	16.7	71.4	0
Number of stocked milacres per acre .	200	50	50
Number of seedlings per acre	250	50	50

* Natural or volunteer seedlings only.

Counts of spruce and fir seedlings which have come in revealed that, as is often the case, Nature has done a much better job than man. Stocking of spruce was 27.5 percent and that of fir 8.3 percent on 120 milacres on and adjacent to the airplane-seeded tract. In spite of some actual observed mortality of spruce seedlings, the number of living spruce has increased from 58 in 1948 to 67 this year. Balsam fir dropped from 39 to 30, but this species is still more plentiful than pine.

A field reconnaissance of the burn on Acadia National Park was made with Park Service personnel in November. Observations there substantiated findings of the previous week, outlined above. The most striking aspect of the development of ground cover since the burn in 1947 has been the widespread germination of spruce. On all but one of seven locations examined, stocking of spruce was fair to excellent—i.e., up to one seedling per milacre or better. Probably 80 percent of the spruce were 2-year trees. White pine was somewhat more abundant here than on the Washington County area, but fir was much more scarce. Gray and white birch reproduction was very thick in places, but so far had not caused any discernible mortality of spruce. The success of spruce reproduction in both areas is attributed largely to the fortuitous occurrence of a heavy seed year in 1947. In most cases the fire did not damage the seed crop, although it was hot enough to kill practically 100 percent of the mature trees.

Miscellaneous

Sims made a general inspection of this research center during October. During his visit considerable progress was made toward setting up the basic pattern for the compartment study to be laid out on the experimental forest.

Hart attended the logging school at the Fernow Experimental Forest until called home because of the illness of his wife. Art's many friends will be glad to know that after nearly a month in the hospital Mim is home again and well on the road to recovery.

McLintock and Rettie participated in Maine's first annual Natural Resources Conservation Conference, held at the University of Maine.

QUARTERLY REPORT--WHITE PINE

October-December 1949

by T. W. McConkey

General

Weather has generally been clear and little field time has been lost. At the end of the quarter, the ground was frozen and bare. The first half of October was rather dry and windy. A class IV fire day was recorded on the 12th. During the same portion of the month, two class III and one high class II days were recorded.

The White Mountain National Forest road crew replaced several culverts and raised the road level over a swampy area on TT 13 during the quarter. Recent rains with alternate freezing and thawing have caused deep ruts over portions of the fill. With this exception, our roads remain in excellent condition and are better than many town roads.

Ricker and McConkey spent two weeks at the logging school in Parsons, W. Va. The trip proved very worth-while, especially in stressing the importance of safety, the value of planning and organization, and the opportunity afforded to meet men from other branches who are engaged in similar work. The free exchange of knowledge and ideas together with the opportunity for a better understanding of Station-wide problems made this school period one of the high-lights of the quarter.

Hybrid poplars planted in the spring of 1948 were measured. Some of the clones on the better sites averaged better than 6 feet of height-growth during each of the first two growing seasons.

In December, 22 manufacturing plants were contacted for information to be used in the Survey of Wood Used in Manufacture in 1948.

Compartment studies

During the quarter, logging was completed on Compartment 3, an example of poor cutting practice. Following usual commercial logging policies, all merchantable softwoods over 8 inches d.b.h. and hardwoods over 12 inches were cut. This made a cut of approximately 69 M bd. ft. or 117 C cu. ft. on the 13.4 acres of merchantable timber within the compartment. Logging costs for labor, equipment operations, repair, and depreciation totaled \$9.74 per C cu. ft.

Compartment 4, an example of good patch cutting, was also logged. A total volume of approximately 28 M bd. ft. was obtained. A portion of this came from a salvage cut of dead pine and hemlock not included in the stand tally. The openings or patches resulting from logging were treated by girdling or cutting all remaining hardwood and poorly-formed softwoods over 3 inches d.b.h.

In connection with the summary of cost and volume records for Compartment 3, certain additions to the minimum record requirements have been made for our own use. In order to develop reliable equipment repair and depreciation data, a cost journal has been made. It provides for actual costs of repair and assigned depreciation of equipment other than automotive. Standard Forest Service rates apply to the latter. Based on our experience, temporary rates have been developed for the tractor boom, tractor canopy, logging scoot, chain saw, and wire rope.

A summary statement supplementing Form CM-9 has also been developed. This summary presents intermediate cost data as well as actual costs for such items as travel and safety features not ordinarily a part of commercial operations.

Camera points have been established on several compartments and before and after logging photos have been taken. To permit ready and accurate identification of photos, an ordinary school slate approximately 10 x 14 inches, bearing the compartment and photo numbers in chalk is set on the photo point marker and is a part of the picture.

Boundaries for Compartment 110, which is to be operated as a woodlot, have been marked. The sapling and reproduction tally has been taken.

Cutting practice level plots

Each of these four 8-acre plots has been assigned a level of cutting practice. On the "poor" plot, all merchantable trees were designated for cutting. On the "fair", approximately 25 well-spaced, thrifty trees per acre were marked to be left as seed trees. It is believed that this results, essentially, in a two-cut shelterwood system. On the "good" plot, about 20 percent of the sawlog volume was marked for cutting. All hardwoods of poor form and species over 5 inches d.b.h. were marked for removal as products in addition to the sawlog marking. The "good" level approximates a three-cut shelterwood system. On the "high-order" plot, about 7 percent of the total sawlog volume was marked for cutting. This is a very light thinning in the denser portions of the stand. It removes a few of the codominant and intermediate trees to encourage initial decomposition of the litter on the forest floor. With the exception of a few well-formed stems, or on swampy ground where needed for stand protection against wind-throw, all hardwoods, undesirable softwoods, or poorly formed desirables in the understory were marked for removal in cultural operations. In comparison with the other plots, the "high level" can be described as five-cut shelterwood silviculture.

The logging crew spent about 4 weeks cutting the saplings and products on the high-order plot. In addition, the total cut of about 9 M bd. ft. of sawlogs has been made and the logs removed.

Cooperative agreement

The cooperative agreement with the L. L. Clark Lumber Company covering our woods operations is proving satisfactory. Since its approval on August 9, 1949, we have cut and delivered to the roadside about 125 M bd. ft. of sawlogs. On October 24, 1949, the agreement was amended to include the cutting practice level plots and to increase the payment for forest products cut and delivered by \$5.00 per M bd. ft. for grade 1 white pine logs, and \$2.00 per M bd. ft. for white pine grades 2 and 3 and logs of other species.

After discussing log grades with Mr. Lockard of the Forest Utilization Service, our log-grading practice has become more rigid, especially in relation to hidden defects.

Regeneration

Airplane seeding.—Sample seeding quadrats, which were established after seeding in early 1948, were remeasured. Additional mortality of year-old seedlings was about balanced by second year germination of plane-sown seed. On severely burned areas, results are still unsatisfactory but on moderate burns the catch is apparently adequate.

Planting.—Some of the mixed pine plantations set out in the springs of 1948 and 1949 were reexamined. Where no logging has taken place since the fire, survival is still well above 80 percent. Where areas were logged just prior to planting, mortality due to pales weevil has continued and survival is generally less than 40 percent. Where logging operations went on in the vicinity even after planting, weevil population was very dense and almost 100 percent mortality has resulted.

Cartridge planting

Williamson has located a commercially manufactured planting tube, square, of about 5 cubic inch capacity, made of fertilizer-impregnated paper. It is recommended for a growing period of about 12 weeks and has proven successful in horticultural work.

Charcoal kiln

One burn, of white pine, has been made in the kiln on the Massabesic. The wood was water-soaked and apparently the draft should have been increased to secure a more complete burn. The charcoal produced is naturally light in weight but there appears to be a minimum of

dust and ash. Future plans for charcoal production depend on locating suitable markets.

Visitors

A group of farm foresters from New England and New York spent a few hours on the Massabesic Experimental Forest at the conclusion of their annual meeting at Bridgton, Maine.

Sims visited us in October to inspect research activities.

R-7 Engineer Kennedy and White Mountain National Forest Engineer Crawford inspected fall maintenance of the road system.

Assistant Professor Pauley, Harvard Forest, P. Chr. Nielson and Helge Irgens Moeller from Denmark gathered several bushels of red oak acorns in this vicinity.

Dr. Pierson and Nash and Bell of the Maine Forest Service visited the Massabesic in connection with cooperative studies of pales weevil and direct seeding of paper birch.

Visitors connected with the Station included Schreiner, Lockard, Wright, McLintock, Hart, and Kidd.

There were also several local visitors interested in forest planting, stumpage sales, and land status.

QUARTERLY REPORT -- NORTHERN HARDWOODS

October--December 1949

by Robert W. Wilson, Jr.

GENERAL

The Bartlett Experimental Forest was closed for the year on October 14. All field work on the major studies (birch thinning and hardwood regeneration) in progress has been brought up to date and a great deal of necessary plot maintenance has been completed. Since that time the quarter has been spent largely in analyzing data obtained during the summer.

MANAGEMENT - SPRUCE AND FIR

Cruise lines and plots on the Church Pond Budworm Area were re-located and the lines painted in preparation for remeasurement during the next field season. The area consists of 256 acres of which 168 acres have been cut. Unless cutting is resumed next season the uncut area will be eliminated.

MANAGEMENT - NORTHERN HARDWOODS

Mowing

In 1933, the Green Mountain National Forest undertook a mowing and girdling experiment on the Styles Brook chance near Peru, Vermont. At that time there was considerable interest in the Northeast in mowing advance reproduction as a means of obtaining hardwood reproduction of better form and quality.

Three plots of 5 acres each, with appropriate isolation strips, were laid out in an old-growth hardwood stand. Reproduction tallies were made on 200 milacres in each plot. During the winter of 1933-34 all plots were clear-cut, which removed an average of 16 trees per acre 12" and over, mostly sugar maple. The following treatments were applied: Plot 1 - All residual trees girdled and reproduction mowed. Plot 2 - Untreated check. Plot 3 - Residuals girdled and saplings clipped.

Final measurements on the experiment were made by Experiment Station personnel in July 1949. Sixteen years after cutting, the mowed and girdled area had fewer stems of smaller diameter but of better species composition than the girdled plot. Both plots are superior to the check plot in number of stems, average diameter and species composition.

The species composition based on the dominant tree on each mil-acre is nearly the same for the two treated plots except that the unmowed plot has a higher percent of yellow birch. This plot also has a slight advantage in diameter of dominant timber species while the weed species are smaller than on the mowed and girdled area.

Crop trees were selected on each milacre as the best tree of timber species which was 0.6" d.b.h. and over. The form of these trees was rated in three classes. On the mowed and girdled plot 66 percent of the crop trees was classified as good and fair compared to only 52 percent on the girdled plot. The check plot was also superior to the girdled plot, with 56 percent in the good and fair classes.

In no way do the differences between mowed and girdled, and girdled alone seem sufficient to justify any expense for mowing. This experiment used 55 man-hours (CCC labor) per acre for mowing. However, girdling provided a distinct improvement in the subsequent stand and is probably well worth the 8 man-hours (CCC labor) per acre it required.

Development of the residual stand after commercial clear-cutting

From the tallies kept of ungirdled residual trees on the check plot and its isolation strip (6.6 acres total) of the mowing experiment summarized above, it is possible to trace fairly well the development of the stand.

Before cutting, the stand contained 9,700 board feet and 93 trees per acre 6" d.b.h. and over. The commercial clear-cutting removed about 16 trees per acre, 12" d.b.h. and over, more than half of which were sugar maple. The average diameter of all trees cut was 19.9".

In the 2 years following cutting, approximately three trees per acre died. Beech from 8" to 18" d.b.h. accounted for about half of these. Yellow birch lost over one tree per acre in the 22" to 32" size class, while sugar maple losses were small.

Three years later in 1938, beech had lost an additional $1\frac{1}{2}$ trees per acre in the 10 to 20" size classes. Yellow birch lost nearly two trees per acre, mostly 26 to 38" in size. Sugar maple losses were small although in the larger size classes. The stand as a whole shows a decline in average diameter to the present. Some time after 1938, however, the number of trees and total basal area began to increase.

Ingrowth has played an important part in the recovery of the stand. Ingrowth to the 6 and 8" classes was evident 2 years after cutting and has continued steadily for beech and sugar maple. Beech ingrowth now more than balances mortality, and the average diameter for the species has begun to rise. Sugar maple also has reached a higher basal area and number of trees than immediately after cutting although the average diameter still appears to decrease.

Yellow birch, on the other hand, has had little growth into the 6" class since 1933 and the decline in number of trees, basal area and average diameter has continued.

Apparently "high grading" of this kind results in an increase of beech in the stand with corresponding decrease of yellow birch and sugar maple at first. Sugar maple, because of its extreme tolerance, will probably be able to hold its position through ingrowth within 5 to 15 years, but yellow birch, lacking this ability to grow well under shade, will become a minor element in the stand.

REGENERATION STUDIES

Sixteen years ago studies were undertaken on the Bartlett Experimental Forest to determine the relative merits of clear, patch and partial cuttings in regenerating the northern hardwood stand. These experiments were established in a many-aged northern hardwood stand which was cut over about 1880. Data on the stand development were obtained during the past field season and are now under analysis. Some results have been obtained on the species composition of the new stand in the clear and patch cuttings.

Although beech formed the largest percentage of advance reproduction on both areas, the more desirable northern hardwoods (yellow birch, sugar maple, white ash and paper birch) have now become the most numerous timber species among the dominants on the clear-cuttings and have just equalled the percentage of beech, red maple and aspen on the patch cuttings. On the clear-cut areas, short-lived weed species (principally pin cherry and striped maple) make up nearly 35 percent of the dominants, compared to only 15 percent on the patch cuttings. However, on both areas only about 13 percent of the dominant weeds have no crop tree to succeed them.

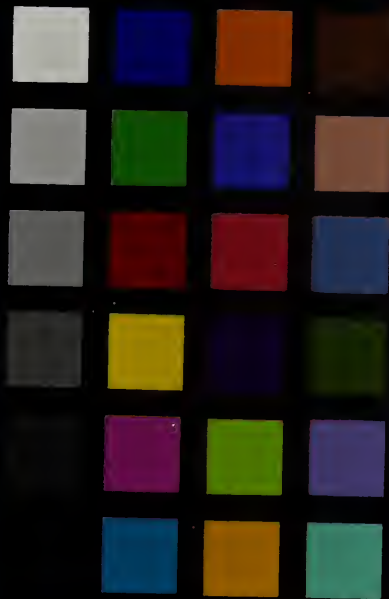
Parts of each of these areas were mowed and the rest left unmowed. Mowing has had no effect on species composition under either treatment. This bears out the findings in Vermont.

MISCELLANEOUS

Tom Jones of the BPI and Dave Crosby of BE&PQ spent a week at Bartlett making intensive observations of beech scale and *Nectria* conditions on plots where we have complete records for the last 15 years.

Wilson spent about a week contacting nonrespondents to the questionnaire, Wood Used in Manufacture, 1948.

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